U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: STANDARDS FOR AIRPORT MARKINGS

Date: 9/27/93
Initiated by: AAS-300

AC No: 150/5340-1G
Change:

1. PURPOSE. This advisory circular (AC) contains the Federal Aviation Administration (FAA) standards for markings used on airport runways, taxiways, and aprons.

2. CANCELLATION. AC 150/5340-1F, Marking of Paved Areas on Airports, dated October 22, 1987, is cancelled.

3. EXPLANATION OF CHANGES. This AC has been written in a new format to more closely define the essential requirements for each type of marking. In addition, new standards have been included as follows:

a. Markings for holding positions at taxiway/taxiway intersections.

b. Surface painted holding position, direction, and location signs.

c. Geographic position markings.

d. Vehicle roadway markings.

e. Nonmovement area boundary markings.

f. Ground receiver checkpoint markings.

g. Taxiway edge markings to delineate taxiway from adjacent pavement intended for use by aircraft..

h. An alternate configuration for runway threshold markings.

i. Markings for a blast pad or stopway or taxiway preceding a displaced thershold.

4. METRIC UNITS. To promote an orderly transition to metric units, the text and figures include both English and metric dimensions. The metric conversions are based on operational significance and may not be exact equivalents. Until there is an official changeover to the metric system, the English dimensions should be used.

LEONARD E. MUDD
Director, Office of Airport Safety and Standards

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CHAPTER 1. MARKINGS FOR PAVED RUNWAYS AND TAXIWAYS

SECTION 1. GENERAL

1. **PURPOSE.** This chapter provides the standards for markings used on paved areas (runways, taxiways, aprons, and roadways) on airports. Markings for aircraft parking positions on aprons are addressed in Chapter 2.

2. **DEFINITIONS.** The following definitions apply to terms used in this AC:

a. Displaced Threshold. A threshold that is located at a point on the runway other than the designated beginning of the runway.

b. Nonprecision Instrument Runway. A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance for which a straight-in or side-step nonprecision approach procedure has been approved.

c. Precision Instrument Runway. A runway having an existing instrument approach procedure utilizing air navigation facilities with both horizontal and vertical guidance for which a precision approach procedure has been approved.

d. Relocated Threshold. The point that is the beginning of the runway when a paved area not available for either landing or takeoff exists prior to (the approach side of) the threshold.

e. Runway Threshold. The beginning of the runway that is available for landing.

f. Visual Runway. A runway having no straight-in instrument approach procedure.

3. **MARKING PRACTICES.** To increase the conspicuity of markings on light-colored pavements, particularly in low visibility conditions, the contrast of the markings can be increased by outlining with a black border at least 6 inches (15 cm) in width. Outlining is also effective for highlighting holding position markings. Striated markings may be used in areas subject to frost heave and may also be used for temporary markings in nonfreeze areas. Striated marking consists of painted stripes 4 inches (10 cm) to 8 inches (20 cm) in width separated by unpainted stripes. The width of the unpainted stripe may not exceed the width of the painted stripe. Since this method results in reduced marking conspicuity, more frequent maintenance is required to provide an acceptable marking system. Striated marking is not used on Category II or III runways. Glass beads, meeting the requirements of Federal specification TT-B-1325, Beads (Glass Spheres) Retroreflective, may be used to increase the conspicuity of markings on taxiways or aprons but not on runways.

SECTION 2. RUNWAY MARKINGS

4. **APPLICATION.** Table 1 identifies the marking elements for each type of runway as shown in figures 1 and 2. The two ends of a runway having different approach categories, i.e., visual vs. nonprecision instrument, may have different markings. The markings on a runway may be upgraded to include elements that are not required. For example, side stripes, touchdown zone markings, etc., could be installed on a visual runway. If a runway has a displaced threshold, blast pad, stopway, or wide shoulders, additional marking elements may be necessary. The standards for each runway marking element are provided in paragraphs 6 through 17. Use of these standards for marking runways on airports certificated under Federal Aviation Regulation (FAR) Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, represents an acceptable means of complying with that regulation.

5. **RUNWAY MARKING PRECEDENCE.** Where runways intersect, the markings on the runway of the higher precedence continue through the intersection, while the markings of the runway of the lower precedence are interrupted except that the runway threshold marking, designation marking, aiming point marking and touchdown zone markings are relocated along the lower precedence runway to avoid the intersection area. Where aiming point markings are relo-

cated, the threshold will also have to be relocated to retain the required distance from the threshold to the aiming point marking (see figure 3 for an example). For intersection of runways of the same precedence order, the preferred runway (lowest approach minimums or most often used) is considered to be of a higher precedence order. For marking purposes, the order of precedence, in descending order, is as follows:

a. Precision instrument runway, Category III.

b. Precision instrument runway, Category II.

c. Precision instrument runway, Category I.

d. Nonprecision instrument runway.

e. Visual runway.

6. RUNWAY DESIGNATION MARKING

a. Purpose. A runway designation marking identifies a runway by its magnetic azimuth.

b. Location. Runway designation markings, as shown in figures 1 and 2, are located on each end of a runway.

c. Color. Runway designation markings are white.

d. Characteristics. A runway designation marking consists of a number and on parallel runways is supplemented with a letter. A single-digit runway designation number is not preceded by a zero. On a single runway, dual parallel runways and triple parallel runways, the designation number is the whole number nearest one-tenth of the magnetic azimuth when viewed from the direction of approach. For example, where the magnetic azimuth is 183 degrees, the runway designation marking would be 18; and for a magnetic azimuth of 87 degrees, the runway designation marking would be 9. For a magnetic azimuth ending in the number "5," such as 185 degrees, the runway designation marking can be either 18 or 19. On four or more parallel runways, one set of adjacent runways is numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways is numbered to the next nearest one-tenth of the magnetic azimuth.

(1) In the case of parallel runways, each runway designation number is supplemented by a letter, in the order shown from left to right when viewed from the direction of approach, as shown in the following examples:

(a) For two parallel runways having a magnetic azimuth of 182 degrees, the runways would be designated "18L," "18R."

Table 1. Runway Marking Elements

Marking element	Visual runway	Nonprecision instrument runway	Precision instrument runway
Designation (par. 6)	X	X	X
Centerline (par. 7)	X	X	X
Threshold (par. 8)	X[1]	X	X
Aiming point (par. 9)	X[2]	X	X
Touchdown zone (par. 10)			X
Side stripes (par 11)			X

[1] On runways used, or intended to be used, by international commercial transport.

[2] On runways 4,000 feet (1200 m) or longer used by jet aircraft.

(b) For three parallel runways having a magnetic azimuth of 87 degrees, the runways would be designated "9L," "9C," "9R."

(c) For four parallel runways having a magnetic azimuth of 324 degrees, the runways would be designated "32L," "32R," "33L," "33R."

(d) For five parallel runways having a magnetic azimuth of 138 degrees, the runways would be designated "13L," "13R," "14L," "14C," "14R."

(e) For six parallel runways having a magnetic azimuth of 83 degrees, the runways would be designated "8L," "8C," "8R," "9L," "9C," "9R."

(2) The numbers and letters are in the form and proportion shown in figure 4.

7. RUNWAY CENTERLINE MARKING.

a. Purpose. Runway centerline marking identifies the physical center of the runway and provides alignment guidance during takeoff and landing operations.

b. Location. A runway centerline marking is located along the centerline of the runway between the runway designation markings.

c. Color. Runway centerline markings are white.

d. Characteristics. A runway centerline marking consists of a line of uniformly spaced stripes and gaps. The stripes are 120 feet (36 m) in length, and the gaps are 80 feet (24 m) in length. Adjustments to the length of the stripes and gaps, where necessary to accommodate the runway length, are made near the runway midpoint. The minimum width of the stripes is 36 inches (90 cm) for precision instrument runways, 18 inches (45 cm) for nonprecision instrument runways and 12 inches (30 cm) for visual runways.

8. RUNWAY THRESHOLD MARKING.

a. Purpose. A threshold marking identifies the beginning of the runway that is available for landing.

b. Location. The stripes of the threshold marking start 20 feet (6 m) from the runway threshold.

c. Color. Threshold markings are white.

d. Characteristics. The threshold markings may have either of the characteristics in (1) or (2) below, but after January 1, 2008, only those characteristics in (2) will be acceptable.

(1) **Configuration A.** The runway threshold marking consists of eight longitudinal stripes of uniform dimensions disposed symmetrically about the runway centerline as shown in figure 1. The stripes are 150 feet (45 m) long and 12 feet (3.6 m) wide and spaced 3 feet (1 m) apart, except for the center space which is 16 feet (4.8 m). For runways less than 150 feet (45 m) in width, the length of the markings is not changed, but the width of the markings, spaces between markings and distance of markings from the runway edge are changed proportionally. For runways greater than 150 feet (45m) in width, the width of the markings and spaces between the markings may be increased proportionally or additional stripes may be added to both sides.

(2) **Configuration B.** For this configuration, the number of stripes required is related to the runway width as indicated in table 2. The stripes are 150 feet (45 m) long and 5.75 feet (1.75 m) wide and spaced 5.75 feet (1.75 m) apart except the center space is 11.5 feet (3.5 m). The stripes extend laterally to within 10 feet (3 m) of the edge of a runway or to a distance of 90 feet (27 m) on either side of a runway centerline, whichever results in the smaller lateral distance.

9. RUNWAY AIMING POINT MARKING.

a. Purpose. An aiming point marking serves as a visual aiming point for landing operations.

b. Location. The beginning of the aiming point marking commences 1,020 feet (306 m) from the threshold.

c. Color. Aiming point markings are white.

d. Characteristics. An aiming point marking consists of two rectangular markings, 150 feet (45 m) in length, located symmetrically on each side of the runway center line as shown in figure 1. The width of each marking is 30 feet (10 m) for a runway width of 150 feet (45 m) or greater. The lateral spacing between the inner sides of the markings is 72 feet (21.6 m) for a runway width of 150 feet (45 m). For runway widths less than 150 feet (45 m), the width of the markings, and the lateral space between markings, is decreased in proportion to the decrease in runway width. Where touchdown zone markings are provided, the lateral spacing between the markings should be the same as that of the touchdown zone markings.

10. RUNWAY TOUCHDOWN ZONE MARKING.

a. Purpose. Touchdown zone markings identify the touchdown zone for landing operations and are coded to provide distance information.

b. Color. Touchdown zone markings are white.

Table 2. Threshold Stripes Required for Configuration B

Runway width	Number of stripes
60 feet (18 m)	4
75 feet (23 m)	6
100 feet (30 m)	8
150 feet (45 m)	12
200 feet (60 m)	16

c. Location and Characteristics. Touchdown zone markings consist of groups of one, two, and three rectangular bars symmetrically arranged in pairs about the runway centerline as shown in figure 1. For runways less than 150 feet (45m) wide, the markings and spaces are reduced proportionally, but the lengths remain the same. For runways having touchdown zone markings on both ends, those pairs of markings which extend to within 900 feet (270 m) of the runway midpoint are eliminated. No touchdown zone markings are eliminated where installed on only one end of the runway. Table 3 lists the touchdown zone markings required when installed on both runway ends.

11. RUNWAY SIDE STRIPE MARKING.

a. Purpose. Runway side stripes provide a visual contrast between the runway and the surrounding terrain and delineates the width of the paved area that is intended to be used as a runway.

b. Location. Runway side stripes consist of continuous stripes located on each side of the runway. The maximum distance between the outer edges of the stripes is 200 feet (60m).

c. Color. Runway side stripe markings are white.

d. Characteristics. The stripes have a minimum width of 3 feet (1 m) for precision instrument runways and are at least equal to the width of the runway centerline stripe on other runways. The stripes extend to the end of displaced threshold areas which are used for takeoffs or rollouts.

12. RUNWAY THRESHOLD BAR.

a. Purpose. A threshold bar delineates the beginning of the runway that is available for landing when there is pavement aligned with the runway on the approach side of the threshold.

b. Location. A threshold bar is located on the landing runway at the threshold.

c. Color. The threshold bar is white.

d. Characteristics. A threshold bar is 10 feet (3 m) in width and extends across the width of the runway.

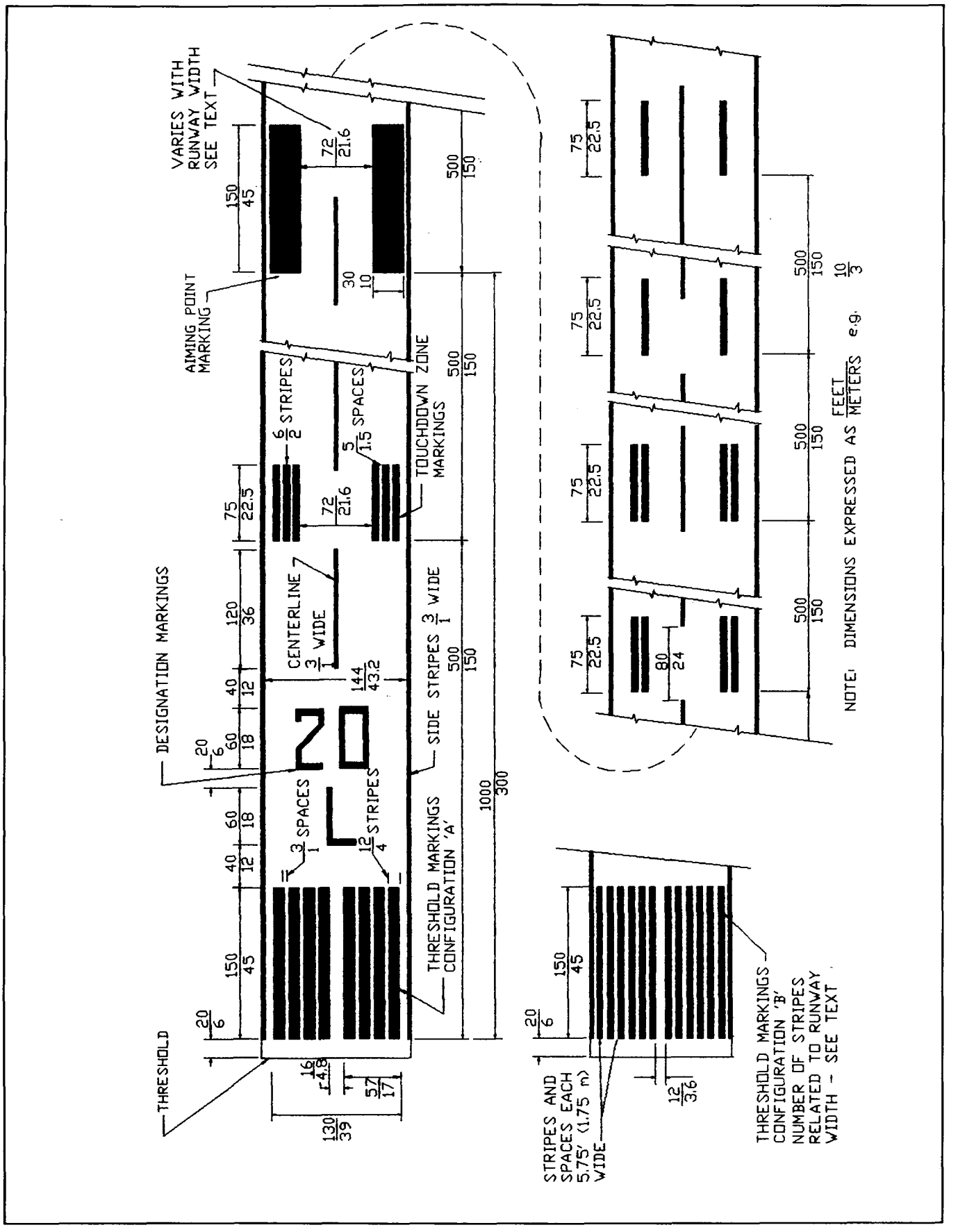


Figure 1. Precision Instrument Runway Markings

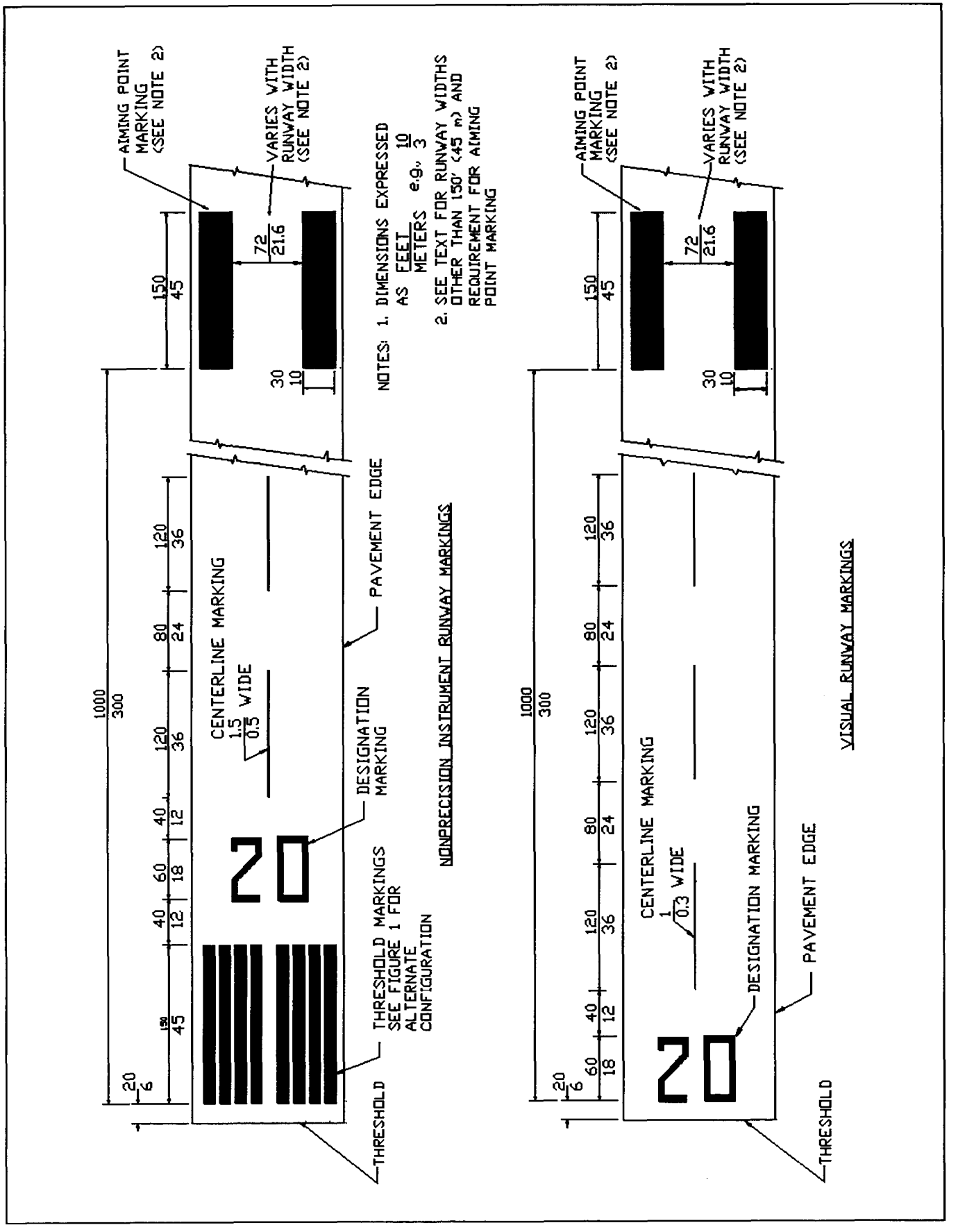
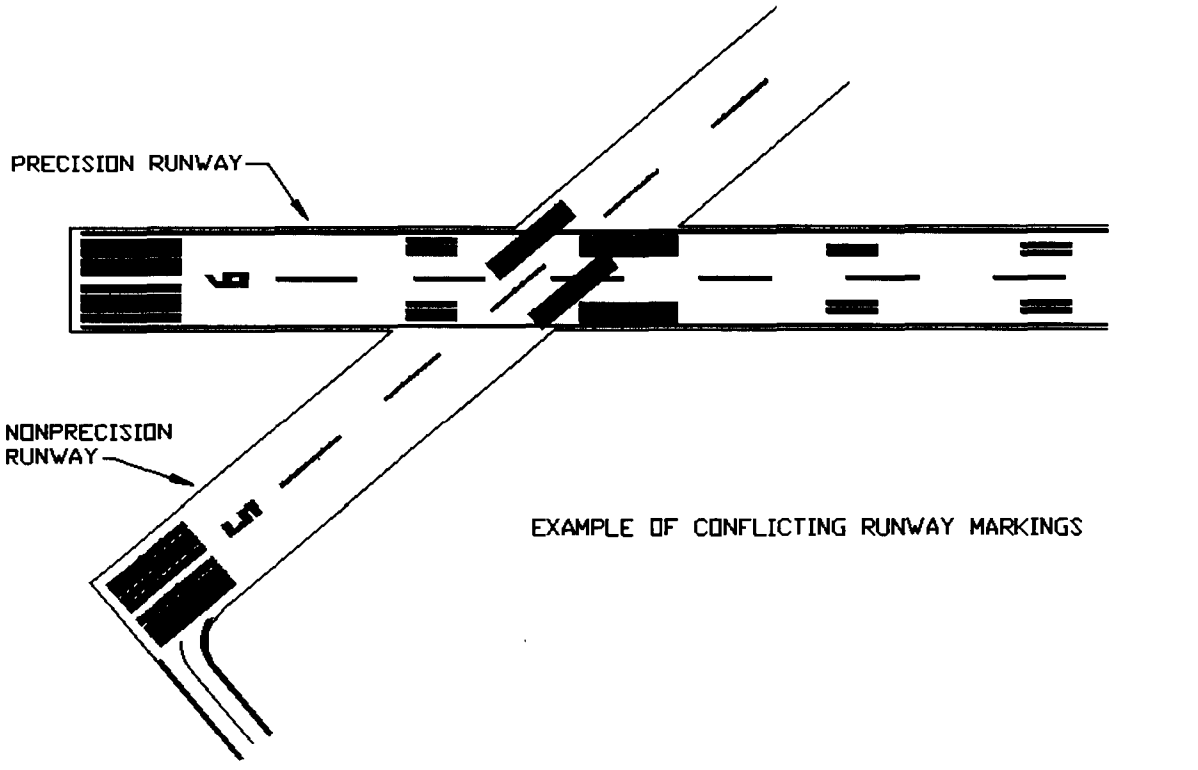


Figure 2. Nonprecision Instrument Runway and Visual Runway Markings



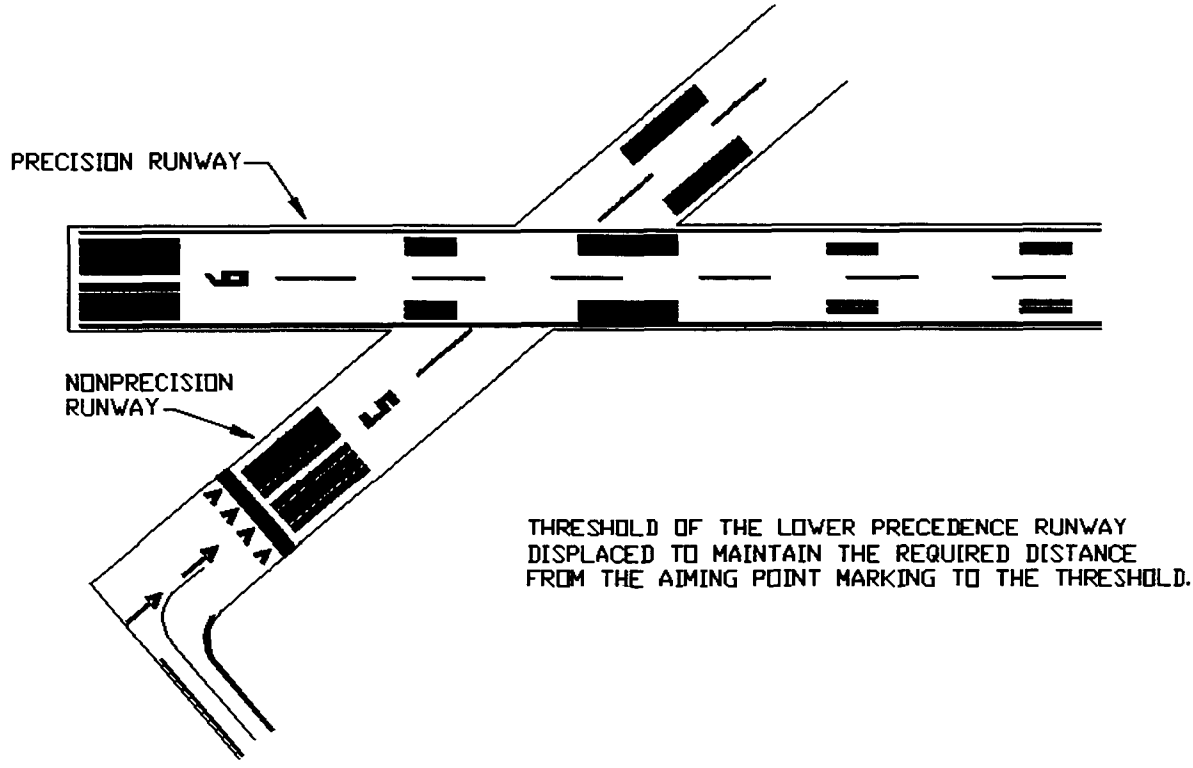


Figure 3. Example of Markings on Crossing Runways

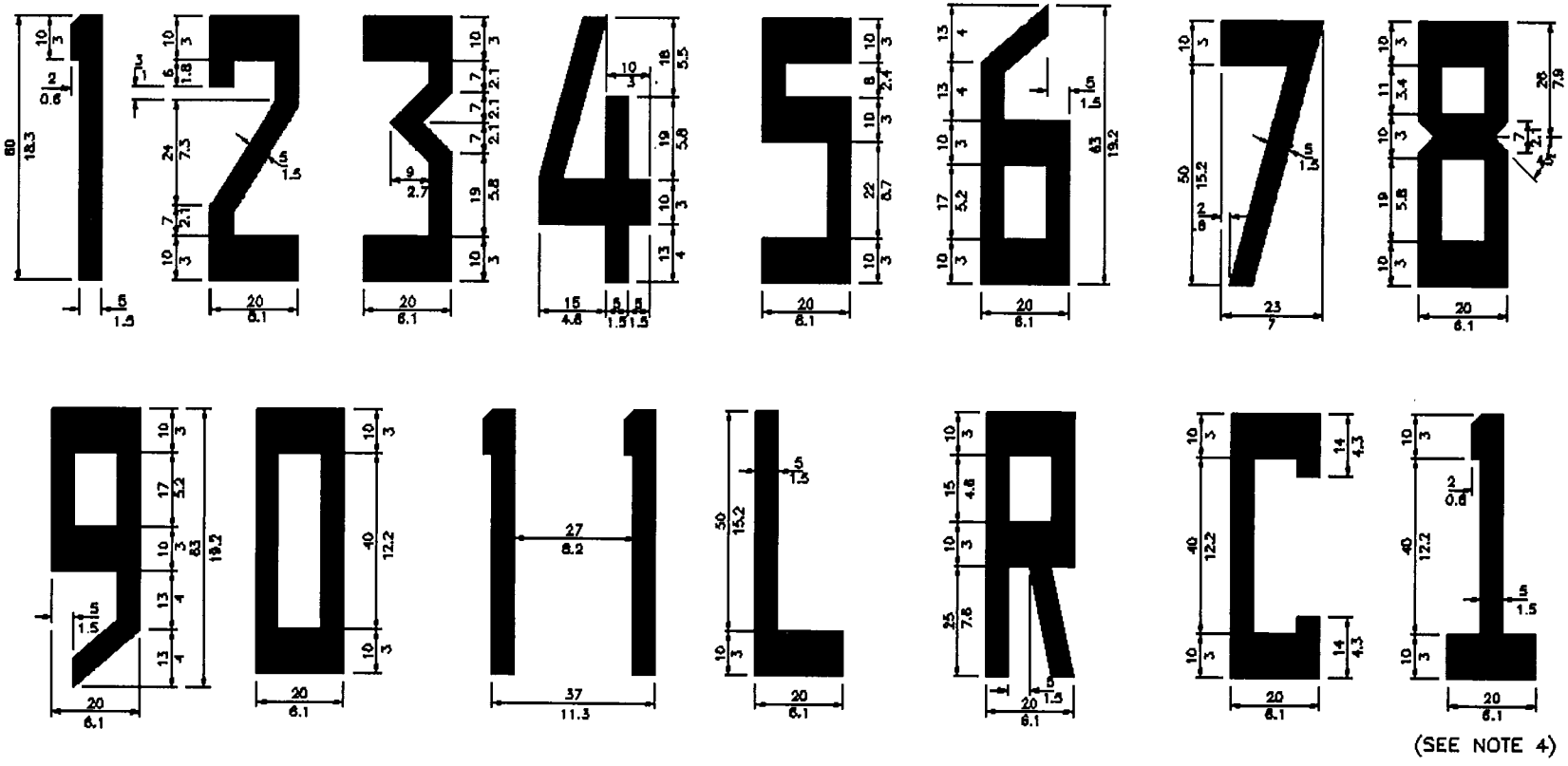


Figure 4. Runway Designation Numerals and Letters

NOTES:

1. ALL NUMERALS EXCEPT THE NUMBER ELEVEN AS SHOWN ARE HORIZONTALLY SPACED 15 FEET (4.6 METERS) APART
2. SINGLE DIGITS SHALL NOT BE PRECEDED BY A ZERO.
3. DIMENSIONS ARE EXPRESSED THUS: $\frac{\text{FEET}}{\text{METERS}}$ e.g. $\frac{30}{9}$
4. THE NUMERAL 1, WHEN USED ALONE, CONTAINS A HORIZONTAL BAR TO DIFFERENTIATE IT FROM THE RUNWAY CENTERLINE MARKING
5. SINGLE DESIGNATIONS ARE CENTERED ON THE RUNWAY PAVEMENT CENTERLINE. FOR DOUBLE DESIGNATIONS, THE CENTER OF THE OUTER EDGES OF THE TWO NUMERALS IS CENTERED ON THE RUNWAY PAVEMENT CENTERLINE.
6. WHERE THE RUNWAY DESIGNATION CONSISTS OF A NUMBER AND A LETTER, THE NUMBER AND LETTER ARE LOCATED ON THE RUNWAY CENTERLINE IN A STACKED ARRANGEMENT AS SHOWN IN FIGURE 1.

13. DEMARCATION BAR.

a. Purpose. A demarcation bar delineates a runway with a displaced threshold from a blast pad, stopway or taxiway that precedes the runway.

b. Location. The demarcation bar is located on the blast pad, stopway or taxiway at the point of intersection with the runway as shown in figure 8.

c. Color. The demarcation bar is yellow.

d. Characteristics. A demarcation bar is 3 feet (1 m) wide and extends across the width of the blast pad, stopway or taxiway.

14. ARROWS AND ARROWHEADS.

a. Purpose. Arrows are used to identify a displaced threshold area and are useful for centerline guidance for takeoffs and/or rollouts. Arrowheads are used in conjunction with a threshold bar to further highlight the beginning of a runway where the use of chevrons is not appropriate.

b. Location. Where a runway threshold is permanently displaced, arrows and arrowheads are provided in the portion of the runway before the displaced threshold (see figure 5). Where the pavement area preceding a runway is used as a taxiway, arrowheads are provided prior to the threshold bar (see figure 6).

c. Color. Arrows and arrowheads used in a displaced threshold area are white. Arrowheads used on a taxiway prior to a runway threshold are yellow.

d. Characteristics. Dimensions and spacings of arrows and arrowheads are as shown in figure 5 and figure 6, respectively.

15. CHEVRONS.

a. Purpose. Chevrons are used to identify pavement areas unusable for landing, takeoff, and taxiing.

b. Location. Chevrons are located on pavement areas that are aligned with and contiguous to the runway as shown in figure 7.

c. Color. Chevrons are yellow.

d. Characteristics. Dimensions and spacings of chevrons are shown in figure 7.

16. RUNWAY HOLDING POSITION MARKINGS ON RUNWAYS.

a. Purpose. These markings are installed on a runway where an aircraft is supposed to stop when the runway is normally used as a taxiway or used for "land and hold short operations."

b. Location. Holding position markings for runway/runway intersections are located in accordance with table 4 for the most demanding aircraft using the runway. The location of the holding position markings on runways at other than runway/runway intersections must be determined on a case-by-case basis by the FAA. Also, any reduction to the minimum distances permitted in table 4 must be coordinated with the regional Flight Standards Division and Airports Division.

c. Color. Holding position markings on runways are yellow.

Table 3. Pairs of TDZ Markings Required When Installed on Both Runway Ends

Runway length	Markings on each end
7990 feet (2936 m) or greater	Full set of markings
6990 feet (2737 m) to 7989 feet (2935 m)	Less one pair of markings
5990 feet (1826 m) to 6989 feet (2736 m)	Less two pairs of markings
4990 feet (1527 m) to 5989 feet (1825 m)	Less three pairs of markings

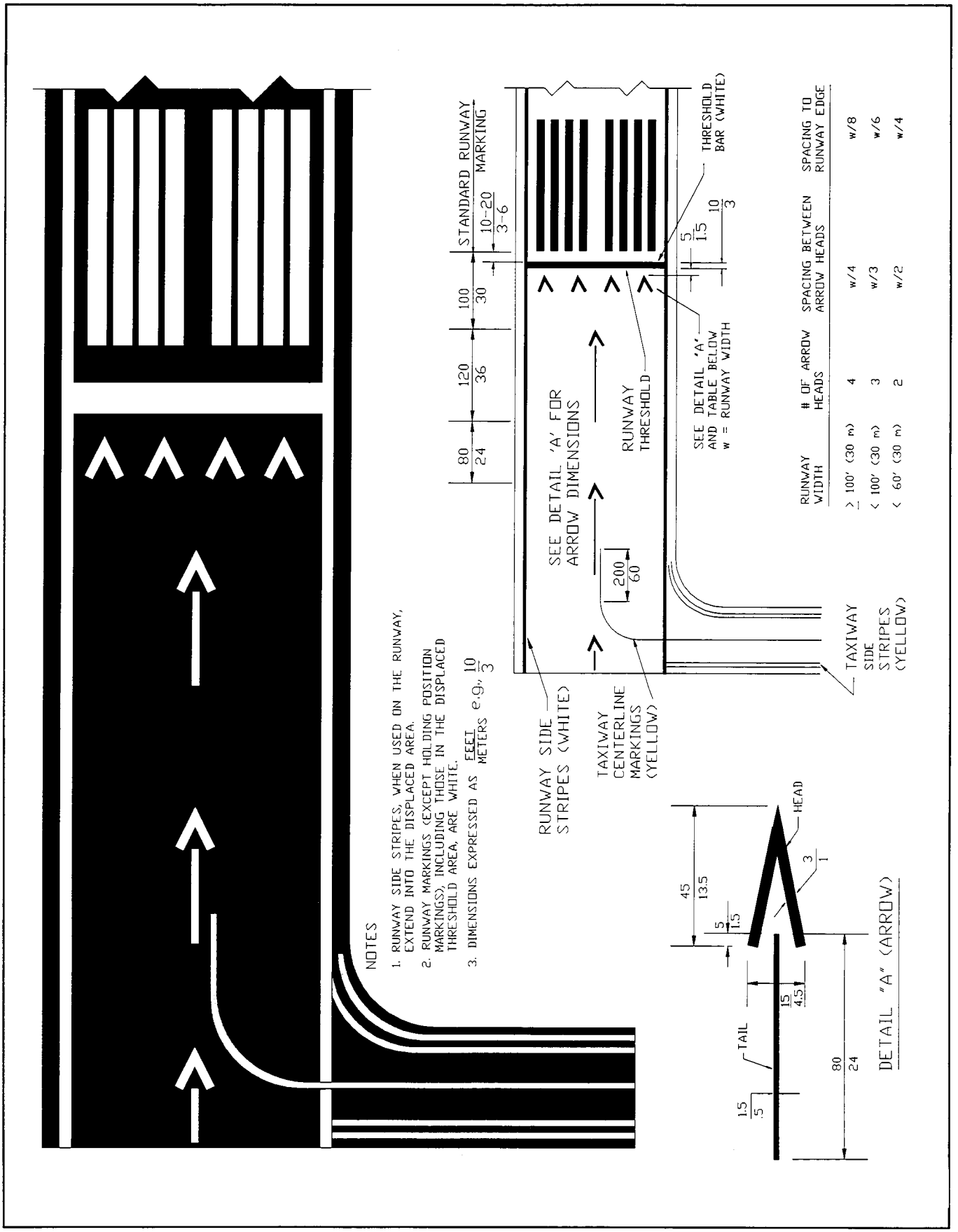


Figure 5. Displaced Threshold Markings

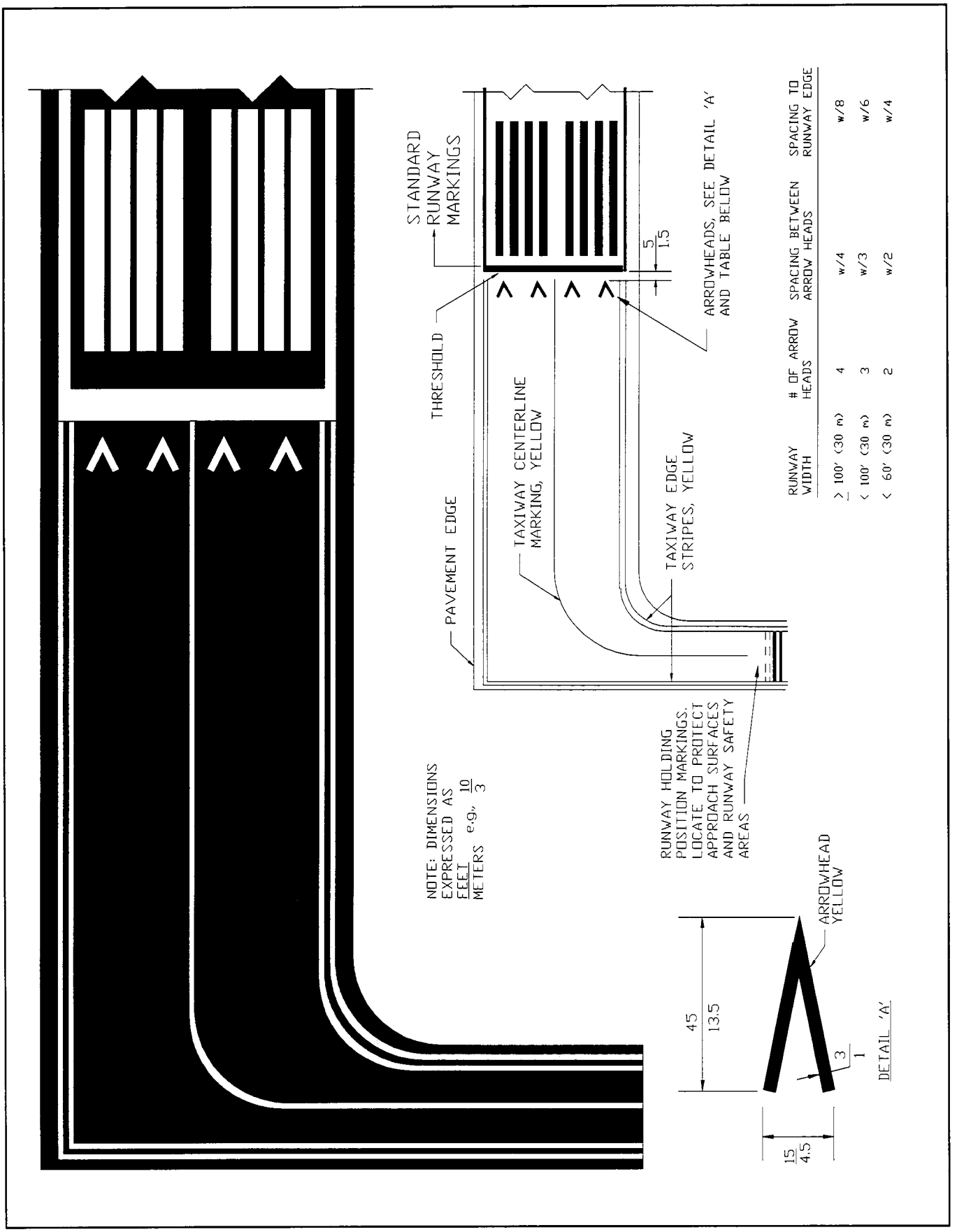


Figure 6. Markings for Taxiway Aligned with Runway

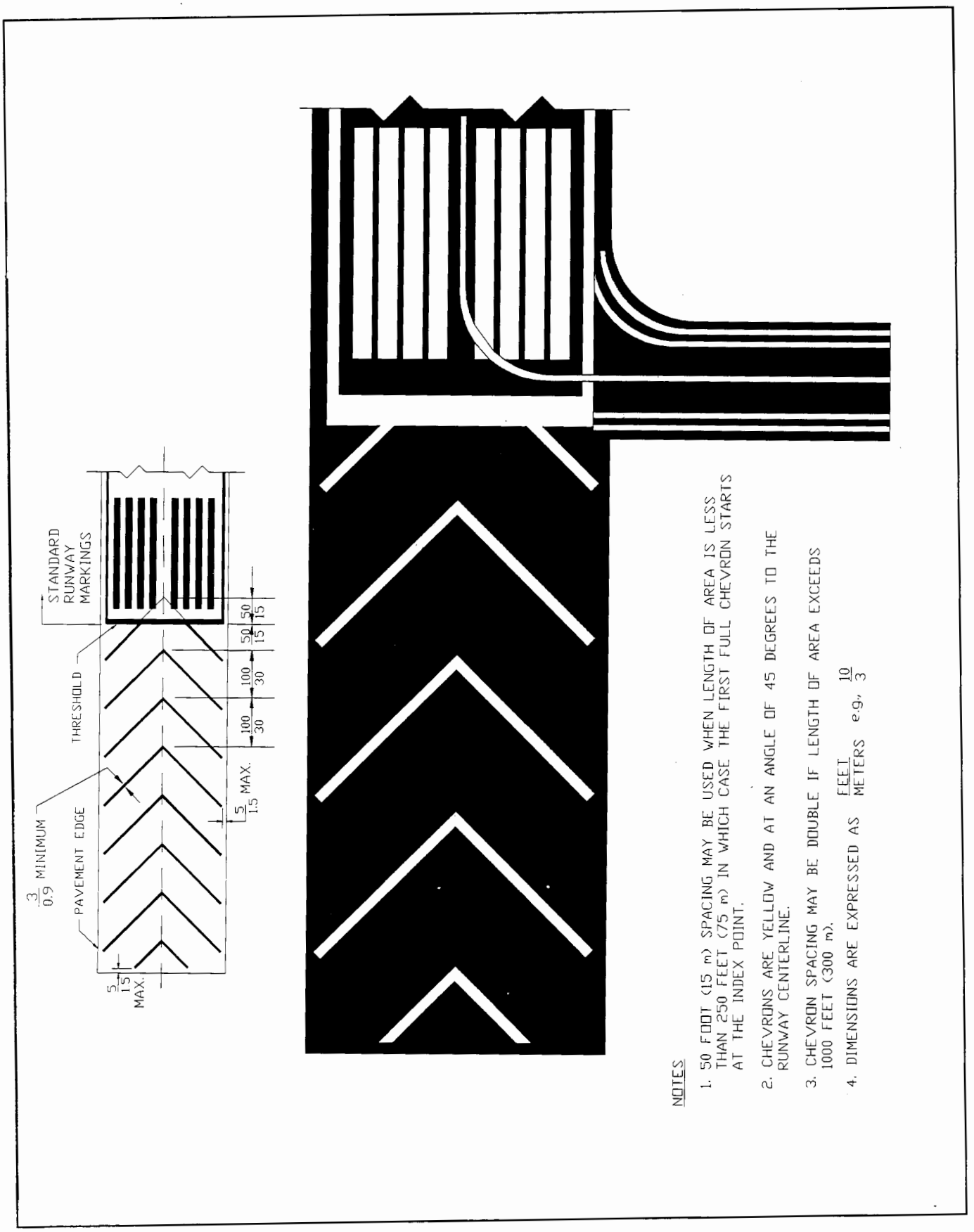


Figure 7. Markings for Blast Pads and Stopways

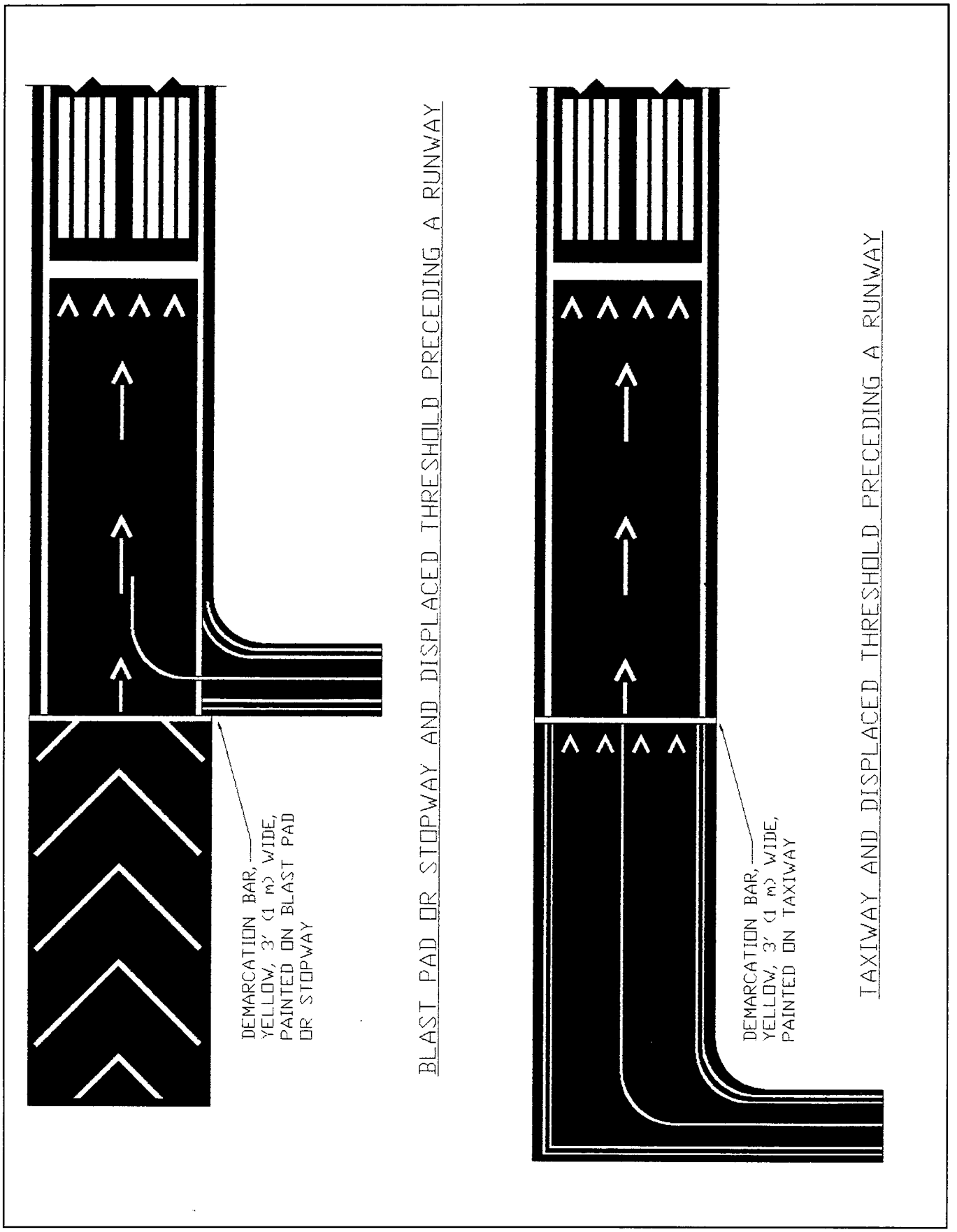


Figure 8. Marking for Blast Pad or Stopway or Taxiway Preceding a Displaced Threshold

d. Characteristics. These markings are identical to taxiway/runway holding position markings shown in figure 10. The solid lines of these markings are always on the side where the aircraft is to hold. The markings are installed perpendicular to the runway centerline and interrupt all runway markings except for the runway designation marking. In the latter case, the holding position markings should be moved so they do not interrupt the designation marking.

17. RUNWAY SHOULDER MARKINGS.

a. Application. Runway shoulder markings are used, when needed, as a supplement to runway side stripes to identify pavement areas contiguous to the runway sides that are not intended for use by aircraft. Runway side stripes are usually sufficient in defining the limits of usable pavement. Shoulder markings are generally needed where pilots have experienced problems identifying the runway from the shoulder thereby creating a need to delineate the shoulder as unusable pavement.

b. Location. Runway shoulder markings are located between the runway side stripes and the pavement edge as shown in figure 9.

c. Color. Runway shoulder markings are yellow.

d. Characteristics. Runway shoulder markings consist of stripes 3 feet (1 m) in width and spaced 100 feet (30 m) apart. The stripes start at the runway midpoint, are slanted at an angle of 45 degrees to the runway centerline, and are oriented as shown in figure 9.

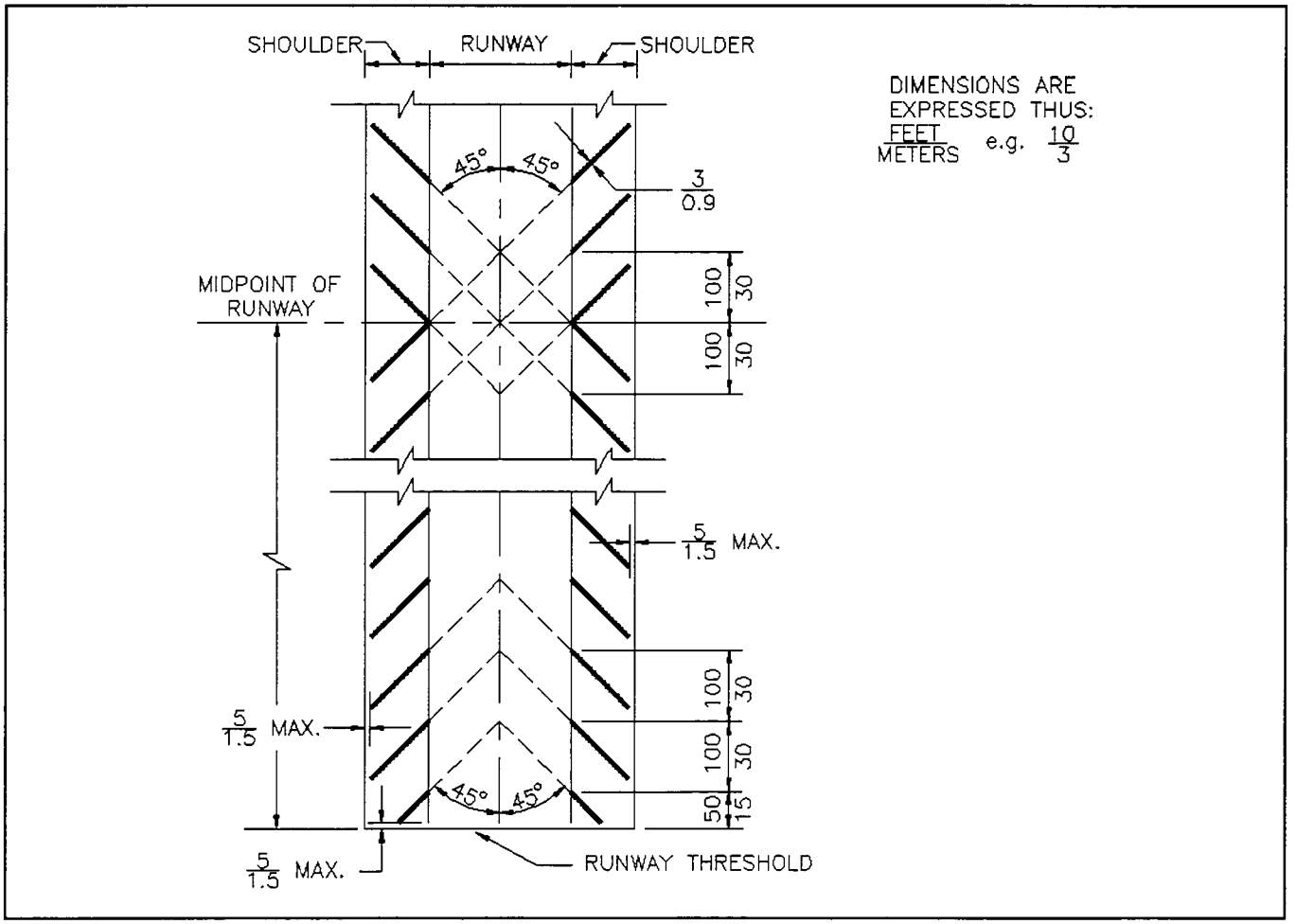


Figure 9. Runway Shoulder Markings

SECTION 3. TAXIWAY MARKINGS

18. APPLICATION. All taxiways should have centerline markings and runway holding position markings whenever they intersect a runway. Taxiway edge markings should be installed wherever there is a need to separate the taxiway from a pavement that is not intended for aircraft use or to delineate the edge of the taxiway. Instrument Landing System/Microwave Landing System (ILS/MLS) critical areas, holding position markings, taxiway/taxiway intersection markings, and taxiway shoulder markings should be installed as appropriate. Use of these standards for marking taxiways on airports certificated under FAR Part 139 represent an acceptable means of complying with the regulation.

19. TAXIWAY CENTERLINE MARKING.

a. Purpose. Taxiway centerline marking provides a visual cue to permit taxiing along a designated path.

b. Location. On a straight section of a taxiway, taxiway centerline markings are provided along the centerline of the designated taxiway. On a taxiway curve, the markings continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway.

(1) At taxiway intersections where fillets do not meet the standards of AC 150/5300-13, Airport Design, current edition, and judgmental oversteering is required, the centerline markings continue straight-through the intersection as shown in figure 12a. Where adequate fillets exist, the centerline markings follow the taxiway curve, as shown in figure 12b, to permit cockpit-over-centerline steering.

(2) On taxiways used as an entrance or exit to a runway, the taxiway centerline marking curves onto the runway and extends parallel to the runway centerline marking for a distance of 200 feet (60 m) beyond the point of tangency.

(3) For taxiways crossing a runway, either straight across or offset and normally used as a taxi route, the taxiway centerline marking may continue across the runway with the following exception. For Category III operations, taxiway centerline markings must continue across the runway for taxi routes designated for use under these conditions. When crossing a runway, taxiway centerline markings will normally be interrupted for the runway markings.

c. Color. Taxiway centerline markings are yellow.

d. Characteristics. A width of 6 inches (15 cm) to 12 inches (30 cm) is acceptable for a taxiway centerline. However, the width selected must be uniform for its entire length. The centerline is continuous in length except where it intersects a holding position marking (see figure 10) or a runway marking element (see paragraph 19b(3)).

20. TAXIWAY EDGE MARKING.

a. Purpose. Taxiway edge markings are used to delineate the edge of the taxiway. They are primarily used when the taxiway edge does not correspond with the edge of the pavement. Two types of markings are used depending upon whether the aircraft is supposed to cross the taxiway edge.

(1) **Continuous Markings.** Continuous taxiway edge markings are used to delineate the taxiway edge from the shoulder or some other contiguous paved surface not intended for use by aircraft. When an operational need exists, the continuous taxiway edge marking may be used to delineate the edge of the taxiway from a contiguous nonpaved surface. Continuous taxiway edge markings are not to be used in situations where aircraft would be required to cross them.

(2) **Dashed Markings.** Dashed taxiway edge markings are used when there is an operational need to define the edge of a taxiway or taxilane on a paved surface where the pavement contiguous to the taxiway edge is intended for use by aircraft, e.g., an apron (see figure 16).

b. Location. Taxiway edge markings are located on the taxiway at its defined edge.

c. Color. Taxiway edge markings are yellow.

d. Characteristics. Continuous taxiway edge markings consist of a continuous double yellow line, with each line being at least 6 inches (15 cm) in width, spaced 6 inches (15 cm) apart (edge to edge). Dashed taxiway edge markings consist of a broken double yellow line, with each line being at least 6 inches (15 cm) in width, spaced 6 inches (15 cm) apart (edge to edge). The lines are 15 feet (4.5 m) in length with 25 foot (7.5 m) gaps (see figure 10).

21. RUNWAY HOLDING POSITION MARKINGS ON TAXIWAYS.

a. Purpose. These markings identify the location on a taxiway where an aircraft is supposed to stop when it does not have clearance to proceed onto the runway.

Table 4. Location of Holding Position Markings for Taxiway/Runway and Runway/Runway Intersections

Aircraft approach category and (airplane design group)	Perpendicular distance from runway centerline to intersecting taxiway/runway centerline in feet (meters) [1]	
	Visual and nonprecision instrument	Precision instrument [2]
A & B (I & II) small airplanes only	125 (38)	175 (53)
A & B (I, II, & III)	200 (60)	250 (75)
A & B (IV)	250 (75)	250 (75)
C & D (I through IV)	250 (75)	250 (75)
C & D (V)	250 (75)	280 (85)

[1] Increases for elevation above sea level are:

a. Aircraft approach categories A and B (Airplane design group III and IV). For precision instrument runways, this distance is increased one foot for each 100 feet of airport elevation above 6,000 feet.

b. Aircraft approach category C (Airplane design group III and IV). For precision instrument runways this distance is increased one foot for each 100 feet of airport elevation above 3,200 feet.

c. Aircraft approach category C (Airplane design group V). For all types of runways, this distance is increased one foot for each 100 feet of airport elevation above sea level.

d. Aircraft approach category D (Airplane design groups I through V). For all types of runways, this distance is increased one foot for each 100 feet of airport elevation above sea level.

[2] When a taxiway or runway intersects a precision instrument runway at an angle of less than 45 degrees, it is necessary to increase the distances in this column if any part of the critical aircraft would penetrate the obstacle free zone (See AC 150/5300-13.)

b. Location. Holding position markings should be located on all taxiways that intersect runways in accordance with table 4 based upon the most critical aircraft using the runway. These markings are also located on taxiways crossing through the runway approach area so that an aircraft on the taxiway will not penetrate any of the following: the surface used to locate the runway threshold, inner approach obstacle free zone, inner transitional obstacle free zone, and clearway. If located closer, such that aircraft penetrate the Terminal Instrument Procedures (TERPS) surfaces, higher minimums may result. A discussion of these surfaces is contained in AC 150/5300-13. Locating hold position markings other than in accordance with the preceding criteria must be approved by the FAA. Except as specified in paragraph 16, holding position markings should not be used for any situation other than those described in this paragraph.

c. Color. Holding position markings on taxiways are yellow.

d. Characteristics. The runway holding position markings are shown in figure 10. The solid lines of these markings are always on the side where the aircraft is to hold. The markings are installed perpendicular to the taxiway centerline but may be canted from the perpendicular in unique situations such as illustrated in figure 11. In these cases, it may be necessary to install additional holding position signs, wig-wag lights, etc.

Table 5. Perpendicular Distances for Taxiway Intersection Markings from Centerline of Crossing Taxiway

Airplane design group [1]					
I	II	III	IV	V	VI
44.5 feet	65.5 feet	93 feet	129.5 feet	160 feet	193 feet
(13.5 m)	(20 m)	(28.5 m)	(39 m)	(48.5 m)	(59 m)

[1] See AC 150/5300-13, *Airport Design*

22. HOLDING POSITION MARKINGS FOR INSTRUMENT LANDING SYSTEM/MICROWAVE LANDING SYSTEM (ILS/MLS) CRITICAL AREAS.

a. Purpose. These markings identify the location on a taxiway or holding bay where an aircraft is supposed to stop when it does not have clearance to enter ILS/MLS critical areas. The critical area is the area needed to protect the navigational aid signal or the airspace required for the approach procedure.

b. Location. Holding position markings for taxiways entering ILS/MLS critical areas are located at the perimeter of the ILS/MLS critical area. Where the distance between the taxiway/runway holding position and the holding position for an ILS/MLS critical area is 50 feet (15 m) or less, one holding position may be established, provided it will not affect capacity. In this case, the taxiway/runway holding position is moved back to the ILS/MLS holding position and only the taxiway/runway holding position markings are installed. The local FAA office will designate the ILS/MLS critical area boundaries for the airport operator. The markings are installed perpendicular to the taxiway centerline but may be canted from the perpendicular in unique situations such as illustrated in figure 11.

c. Color. The ILS/MLS holding position markings are yellow.

d. Characteristics. Holding position markings for ILS/MLS critical areas are as shown in figure 10.

23. HOLDING POSITION MARKINGS FOR TAXIWAY/TAXIWAY INTERSECTIONS.

a. Purpose. These markings identify the location on a taxiway or apron where aircraft are supposed to stop when told to hold short of another taxiway or apron. They should be used where there is an operational need to hold traffic at a taxiway/taxiway intersection, at a geographic position (see paragraph 28), or holding bay, as illustrated in figure 11, to define the edge of the taxiway safety area to assure adequate clearance from taxiing aircraft.

b. Location. Holding position markings for taxiway/taxiway intersections are located for the most demanding aircraft using the airport in accordance with table 5.

c. Color. Taxiway/taxiway holding position markings are yellow.

d. Characteristics. The holding position markings for taxiway/taxiway intersections are as shown in figure 10.

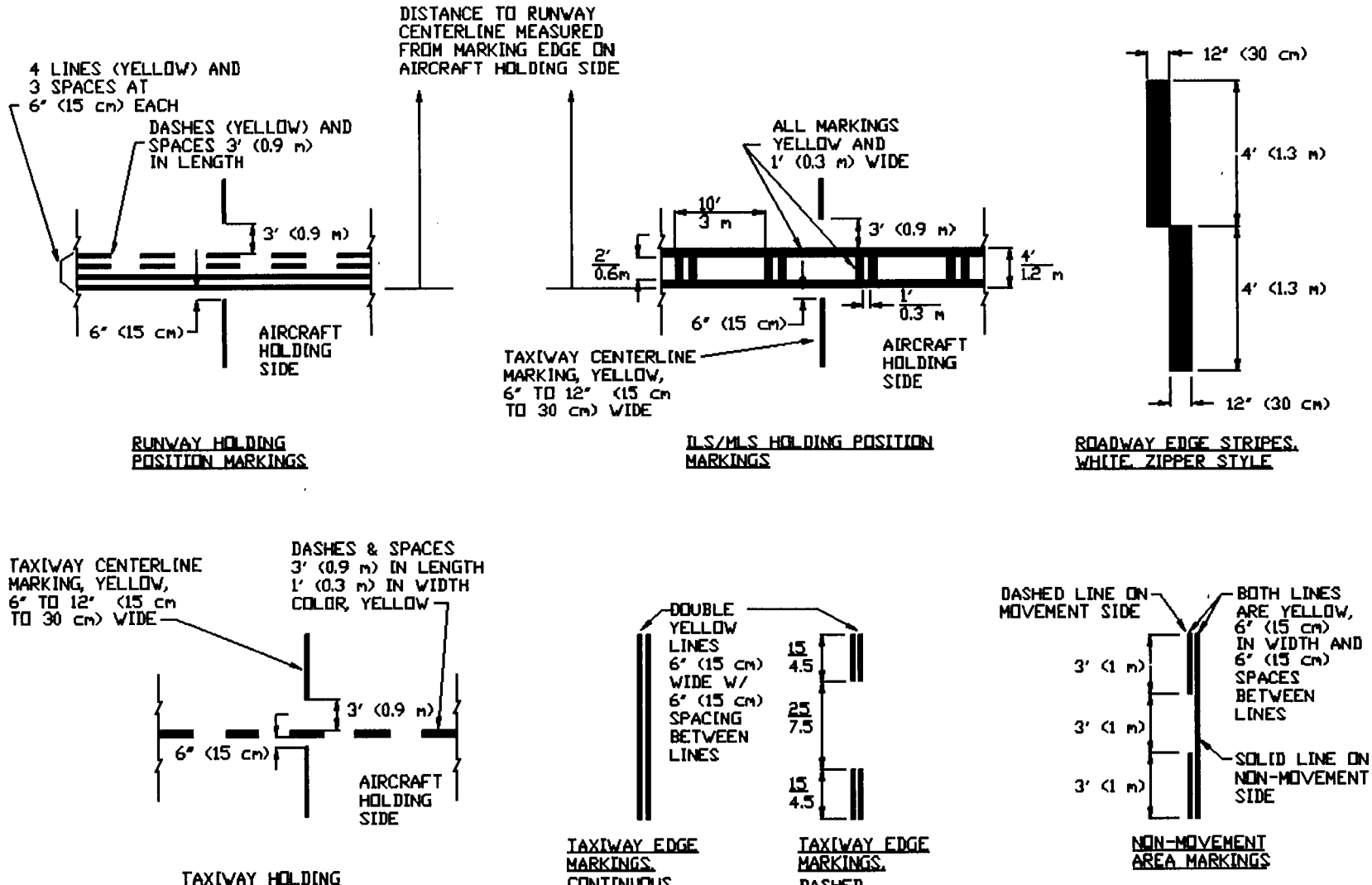
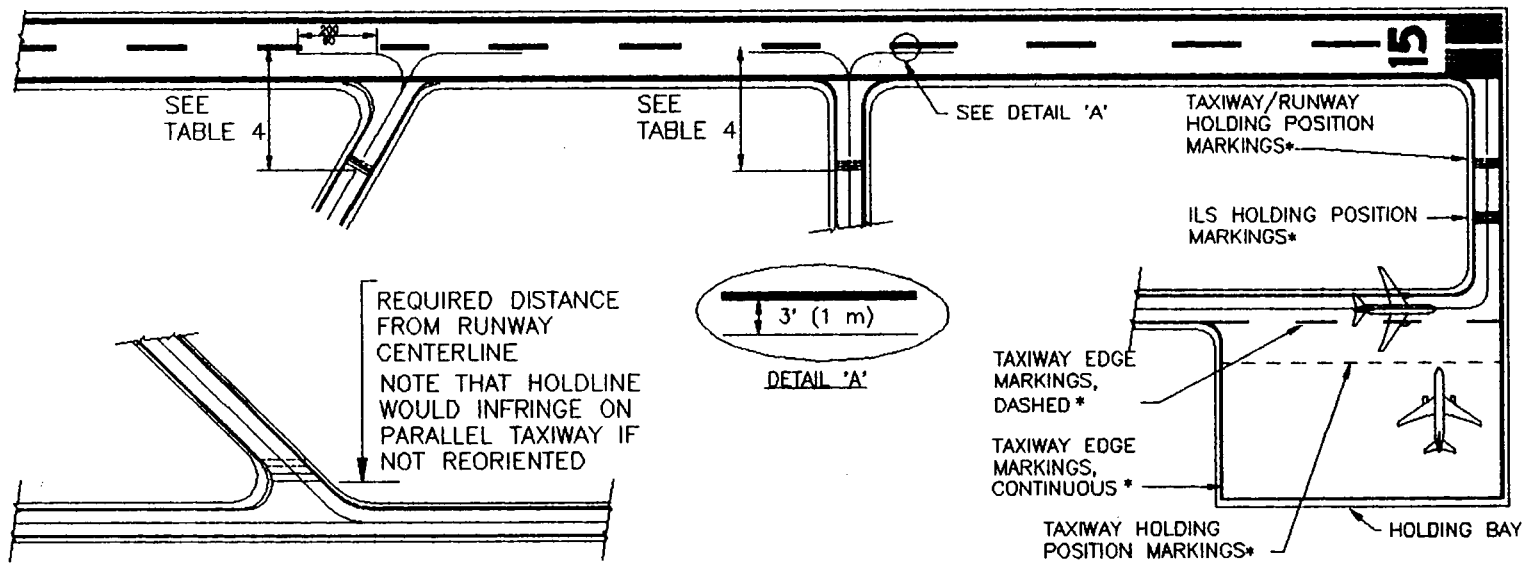
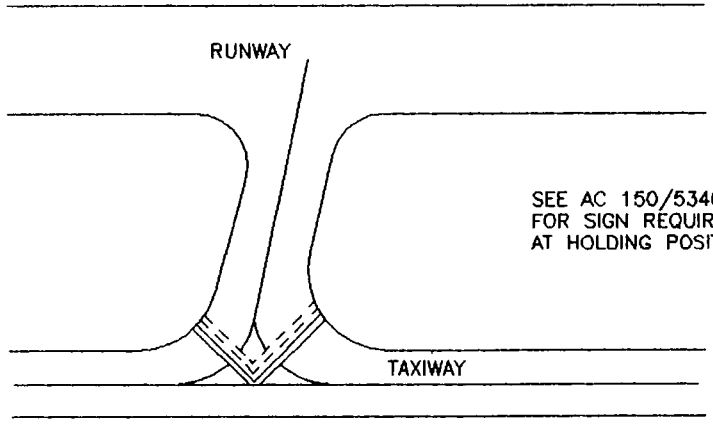


Figure 10. Marking Details



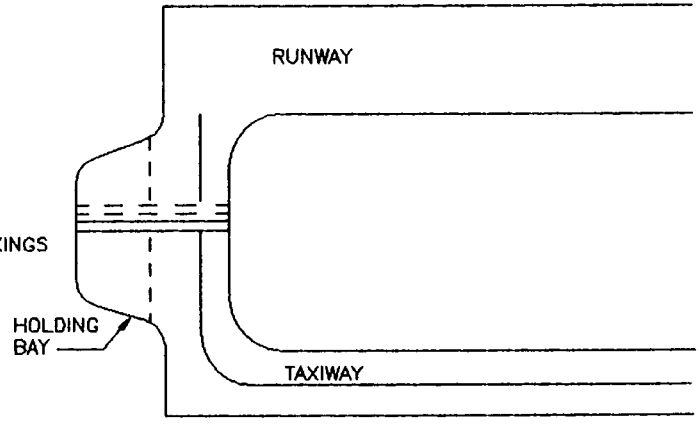
EXAMPLE OF HOLDING POSITION MARKINGS NOT AT RIGHT ANGLE TO TAXIWAY CENTERLINE BECAUSE OF INTERSECTION CONFIGURATION

* REFER TO FIGURE 10 FOR MARKING DETAILS



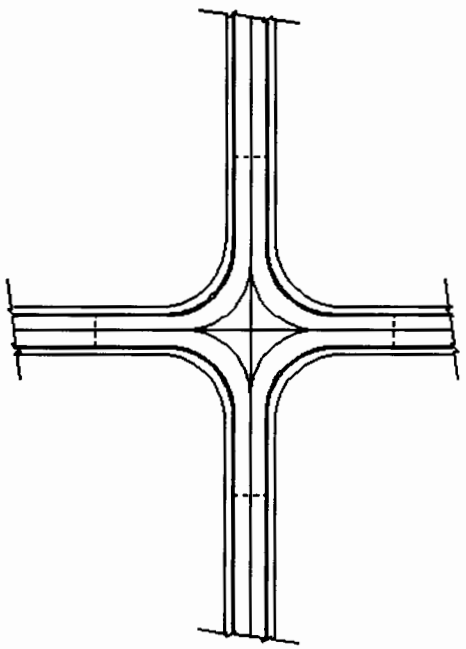
EXAMPLE WHERE HOLDING POSITION MARKINGS DO NOT EXTEND STRAIGHT ACROSS THE TAXIWAY

SEE AC 150/5340-18 FOR SIGN REQUIREMENTS AT HOLDING POSITION MARKINGS

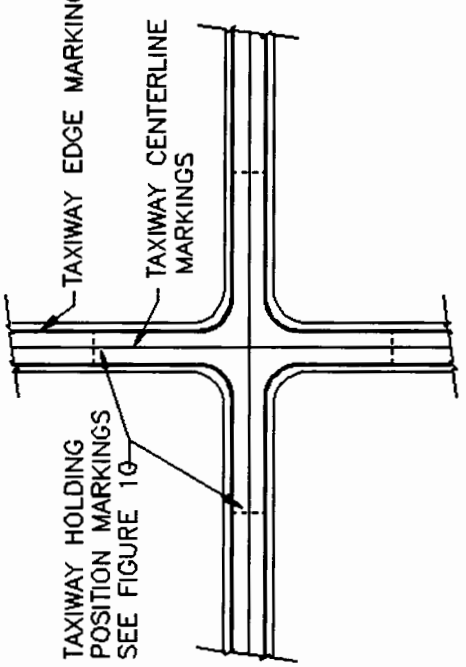


EXAMPLE OF HOLDING POSITION MARKINGS EXTENDED ACROSS HOLDING BAY

Figure 11. Taxiway Markings



B. EXAMPLE OF TAXIWAY CENTERLINE MARKING AT INTERSECTION HAVING STANDARD FILLETS WHICH PERMITS COCKPIT-OVER-CENTERLINE STEERING



A. EXAMPLE OF TAXIWAY CENTERLINE MARKING AT INTERSECTION HAVING LESS THAN STANDARD FILLETS AND REQUIRING JUDGEMENTAL OVERSTEERING

Figure 12. Taxiway Centerline Marking Methods

24. SURFACE PAINTED HOLDING POSITION SIGNS.

a. Purpose. Surface painted holding position signs supplement the signs located at the holding position in accordance with AC 150/5340-18. This type of marking would normally be used where the width of the holding position on the taxiway is greater than 200 feet (60 m).

b. Location. The surface painted holding position sign is located on the left side of the taxiway centerline on the holding side of and 2 feet (0.67 m) prior to the holding position marking as shown in Figure 13. Holding position signs should not be painted on runways.

c. Color. The surface painted holding position sign has a red background with a white inscription.

d. Characteristics. The inscription must have a minimum height of 9 feet (3 m) with a maximum height of 12 feet (3.67 m) being preferable. The inscription must conform in appearance to the letters, numbers, and other symbols in Appendix 1. The background is rectangular and extends a minimum of 15 inches (38 cm) laterally and vertically beyond the extremities of the inscription.

25. SURFACE PAINTED TAXIWAY DIRECTION SIGNS.

a. Purpose. Surface painted taxiway direction signs should be provided when it is not possible to provide taxiway direction signs at intersections in accordance with AC 150/5340-18 or, when necessary, to supplement such signs.

b. Location. Surface painted taxiway direction signs are located adjacent to the centerline with signs indicating turns to the left being on the left side of the taxiway centerline and signs indicating turns to the right being on the right side of the centerline as shown in Figure 13. Taxiway direction signs should not be painted on runways.

(1) When a direction sign is not installed along side of the taxiway, the surface painted direction sign should be located at the same distance from the intersection as the distance specified in AC 150/5340-18.

(2) When a surface painted direction sign supplements a direction sign installed along side of the taxiway, the surface painted direction sign may be located at or anywhere between the distance specified in subparagraph (1) above and the point of divergence of the painted centerlines.

c. Color. The surface painted taxiway direction sign has a yellow background with a black inscription.

d. Characteristics. The inscription must have a minimum height of 9 feet (2.9 m) with a maximum height of 12 feet (3.67 m) being preferable. The inscription must conform in appearance to the letters, numbers, and other symbols in Appendix 1. Each taxiway designation must be accompanied by an arrow showing the general direction of turn. The background is rectangular and extends a minimum of 15 inches (38 cm) laterally and vertically beyond the extremities of the inscription. A 6-inch (15 cm) wide vertical black stripe separates each taxiway designation when more than one designation is included on either side of the centerline.

26. SURFACE PAINTED LOCATION SIGNS.

a. Purpose. Surface painted location signs are used, when necessary, to supplement the signs located along side the taxiway and assist the pilot in confirming the designation of the taxiway on which the aircraft is located.

b. Location. The surface painted location sign is located on the right side of the taxiway centerline.

c. Color. The surface painted location sign has a black background with a yellow inscription and yellow border around its perimeter as shown in figure 13.

d. Characteristics. The inscription must have a minimum height of 9 feet (2.67 m) with a maximum height of 12 feet (3.67 m) being preferable. The inscription must conform in appearance to the letters, numbers, and other symbols in Appendix 1. The background is rectangular and extends a 1 minimum of 15 inches (38 cm), including the 6 inch (15 cm) yellow border, laterally and vertically beyond the extremities of the inscription.

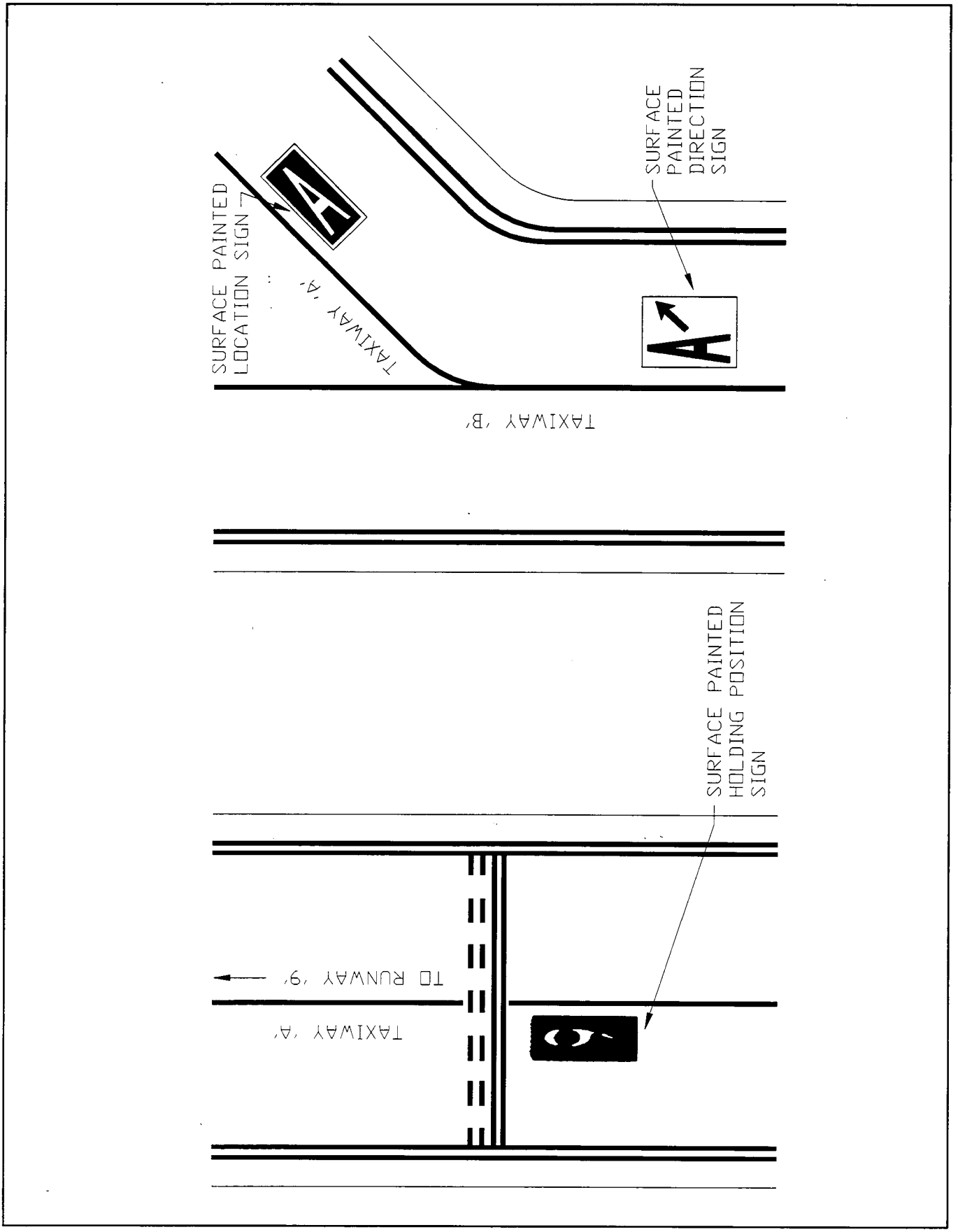


Figure 13. Surface Painted Signs

27. TAXIWAY SHOULDER MARKINGS.

a. Purpose. Holding bays, aprons, and taxiways are sometimes provided with shoulder stabilization to prevent blast and water erosion. This stabilization may have the appearance of a full strength pavement but is not intended for use by aircraft. Usually the taxiway edge marking will define this area, but conditions may exist such as stabilized islands or taxiway curves where confusion may exist as to which side of the edge stripe is the full strength pavement. Where such a condition exists, taxiway shoulder markings should be used to indicate the pavement is unusable.

b. Color. Taxiway shoulder markings are yellow. It is also acceptable to paint the stabilized area green.

c. Location and Characteristics. The stabilized area is marked with 3-foot (1 m) yellow stripes perpendicular to the edge stripes as shown in figure 14. On straight sections, the marks are placed at a maximum of 100-foot (30 m) spacing. On curves, the marks are placed a maximum of 50 feet (15 m) apart between the curve tangents. The stripes are extended to 5 feet (1.5 m) from the edge of the stabilized area or to 25 feet (7.5 m) in length, whichever is less.

28. GEOGRAPHIC POSITION MARKINGS.

NOTE: The interim standards set forth in this paragraph are based upon current applications that are being evaluated as part of the Surface Movement Guidance and Control System (SMGCS) established in AC 120-57, Surface Movement and Guidance Control System, current edition. Standards for these type of markings may change as experience is gained in SMGCS operations.

a. Purpose. Geographic position markings are installed when points are necessary to identify the location of taxiing aircraft during low visibility operations. Low visibility operations are those that occur when the runway visible range (RVR) is below 1200 feet (360 m).

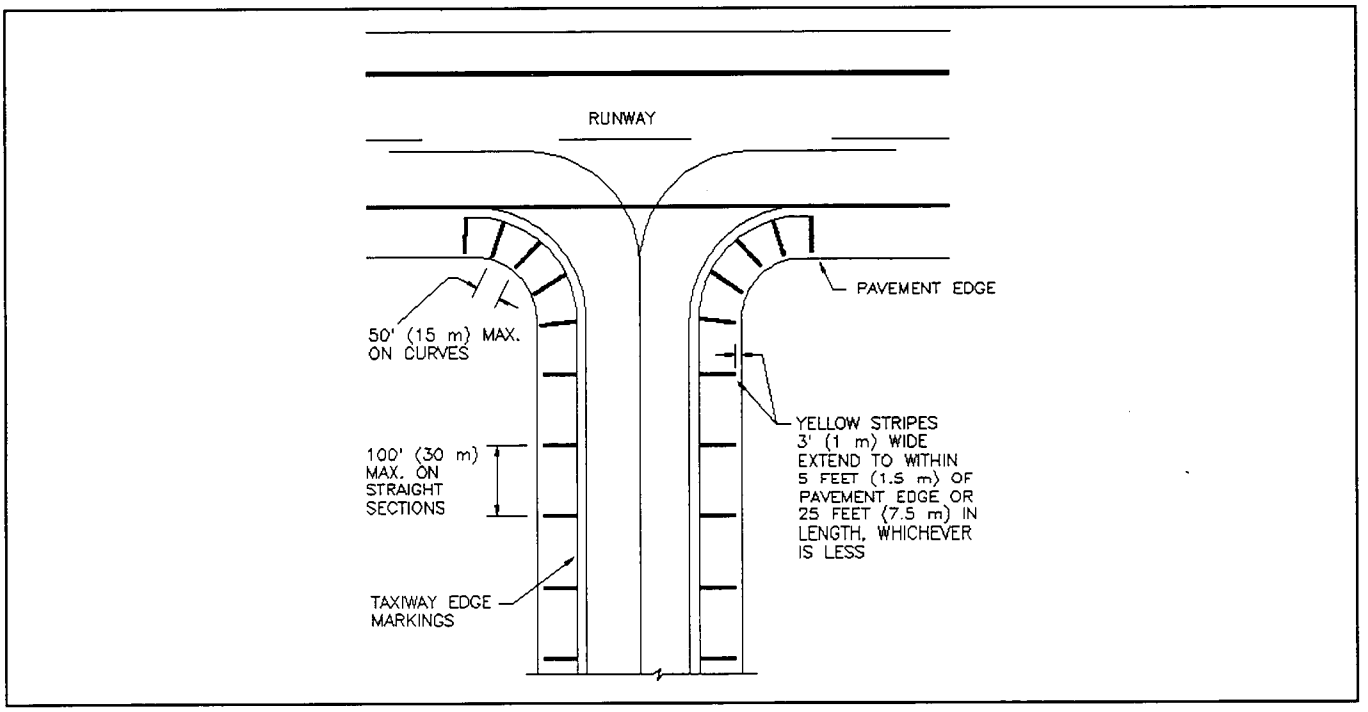


Figure 14. Taxiway Shoulder Markings

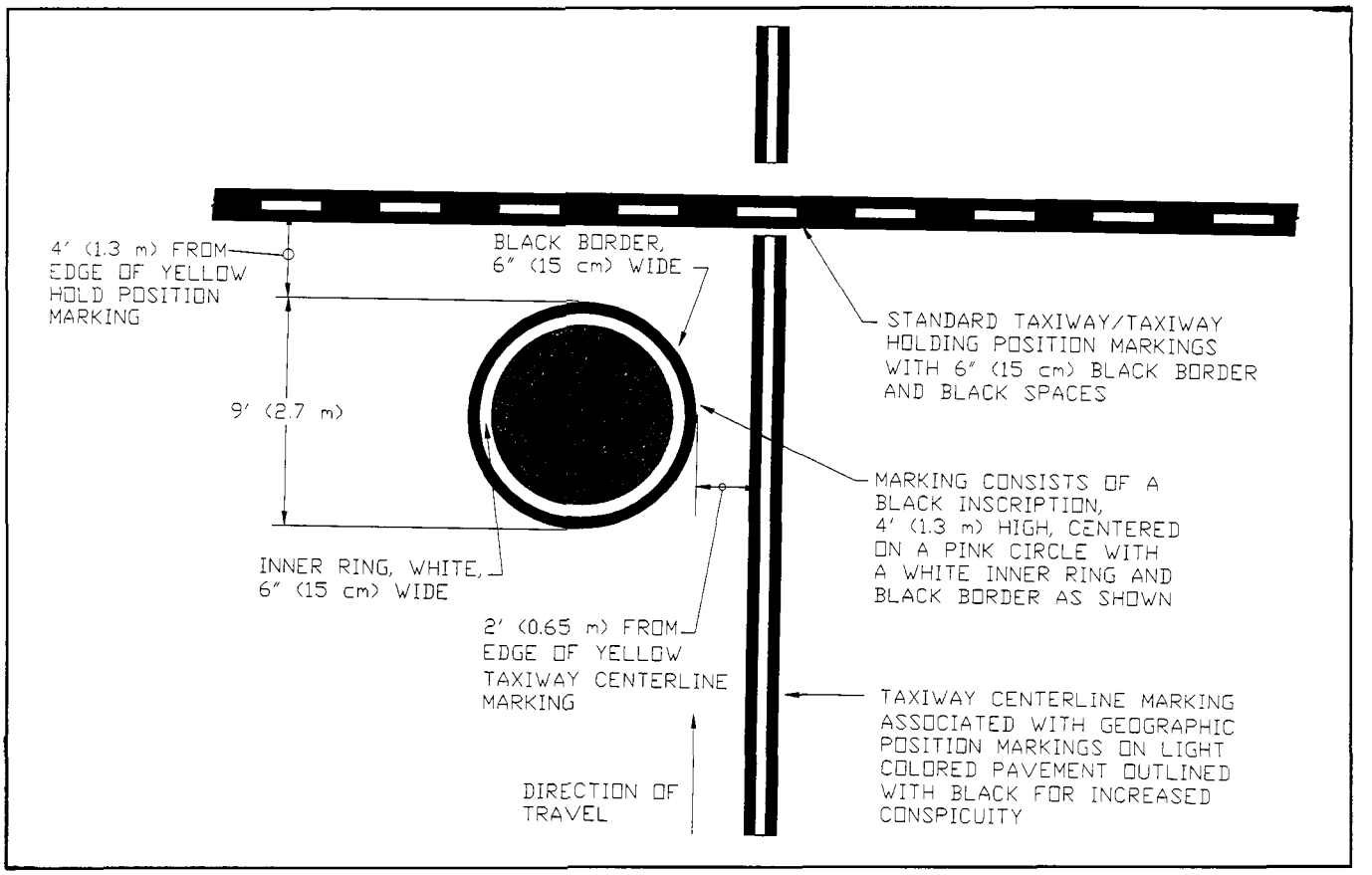


Figure 15. Geographic Position Markings

b. Location. These markings are located along low visibility taxi routes designated in the airport's SMGCS plan. They are positioned to the left of the taxiway centerline in the direction of taxiing. When the geographic position marking will be used by air traffic control as a holding position, it will always be located in conjunction with and prior to the holding position marking as shown in figure 15. When the geographic position marking is not used as a holding position, the installation of the holdline and clearance bar is optional. The geographic position marking should not be located at a runway holding position for the low visibility runway but may be located at the holding positions for other runways that the designated taxi route crosses. Unless the geographic position marking is located at a runway holding position (see paragraph 21), a taxiway/taxiway holding position marking should be used (see paragraph 23). If the geographic position marking is located at a holding position along a taxi route that is designated for use in visibilities below 600 RVR, then a clearance bar consisting of three yellow lights must also be installed in conjunction with the geographic position marking and holding position marking. On a particular airport, the airport operator in coordination with the local airport traffic control tower and the regional Flight Standards Procedures Branch will determine where these markings are needed.

c. Characteristics.

(1) The geographic position marking is a circle with a diameter of 9 feet (2.67 m). When installed on concrete or other light-colored pavements, the circle is comprised of a 6 inch outer black ring contiguous to a 6 inch white ring with a pink circle with a diameter of 7 feet (1.3 m) in the middle as shown in figure 15. When installed on asphalt or other dark-colored pavements, the white ring and the black ring are reversed, i.e., the white ring becomes the outer ring and the black ring becomes the inner ring.

(2) Geographic position markings are designated with either a number or a number and letter. The number corresponds to the consecutive position of the marking on the route. When used the letter indicates the letter designation of the taxiway on which the marking is located. If a geographic position marking is located on a taxiway with an alphanumeric designation only the alpha portion of the designation should be used for designating the geographic position markings. For example, the fourth spot on the route is located on Taxiway A7. The alphanumeric designation for this spot would be "4A." The geographic position marking is never designated with a letter followed by a number.

(3) The designation of the spot should be centered in the circle. The designation is black, has a height of 4 feet (1.3 m) and conforms in appearance to the numbers and letters in Appendix 1.

SECTION 4. OTHER MARKINGS

29. APPLICATION. The markings in this section are used, as appropriate, on airports.

30. VEHICLE ROADWAY MARKINGS.

a. Purpose. The standards for vehicle roadway markings contained in this paragraph are used to delineate roadways located on or crossing areas that are also intended for use by aircraft. Markings for roadways not located on aircraft maneuvering areas should conform, whenever possible, to those in the *U.S. Department of Transportation's Manual on Uniform Traffic Control Devices.*

b. Color. Vehicle roadway markings are white.

c. Location. Vehicle roadways are delineated on aircraft maneuvering areas when there is a need to define a pathway for vehicle operations. A minimum spacing of 2 feet (0.67 m) must be maintained between the roadway edge marking and the non-movement area boundary marking (see paragraph 32).

d. Characteristics.

(1) Vehicle roadway markings consist of a solid line to delineate each edge of the roadway and a dashed line to separate lanes within the edges of the roadway. The edgelines and lane lines are both 6 inches (15cm) wide and the dashes for the lane lines are 15 feet (4.5 m) in length with a spacing of 25 feet (7.5 m) between dashes. These markings are illustrated in figure 16.

(2) In lieu of the solid lines, zipper markings may be used to delineate the edges of the vehicle roadway wherever the airport's SMGCS working group or the airport operator determines that the roadway edges need enhanced delineation. The zipper marking consists of two dashed lines side by side with alternating dashes that are 12 inches (30 cm) wide and 4 feet (1.3 m) in length, along each edge of the roadway as shown in figure 16. Details of the zipper marking are shown in figure 10.

(3) Where a roadway crosses a taxiway, a solid white stripe 2 feet (.67 m) wide is provided across the approach lane at the distances specified in Table 5 to assure adequate clearance from taxiing aircraft. When the roadway is not located on an aircraft maneuvering area, a retroreflective stop or yield sign should be installed on the right hand side of the roadway in conjunction with the solid white stripe.

31. VOR RECEIVER CHECKPOINT MARKINGS

a. Purpose. VOR receiver checkpoint markings allow the pilot to check aircraft instruments with navigational aid signals.

b. Location. VOR receiver checkpoints should be on the airport apron or taxiways (preferably the holding bay but never on a runway) at points selected for easy access by aircraft but where other airport traffic would not be unduly obstructed. VOR receiver checkpoints normally should not be established at distances less than one-half mile from the facility nor should they be established on nonpaved areas.

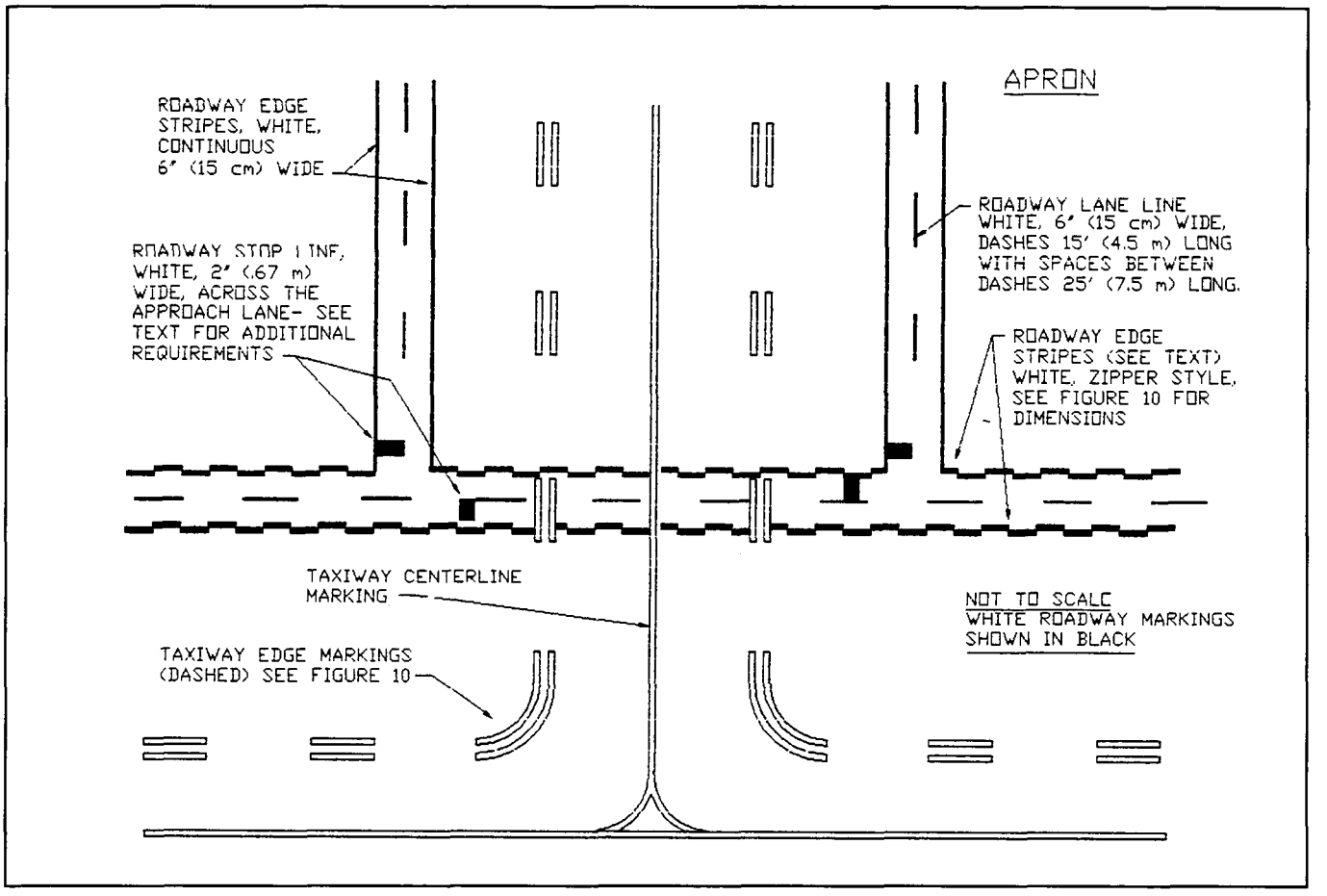


Figure 16. Vehicle Roadway Markings

c. Characteristics. VOR receiver checkpoints are provided with painted markings and an associated sign.

(1) Markings. The checkpoint is marked with a painted circle of the size and characteristics shown in figure 17. The diameter arrow is aligned in the direction of the checkpoint azimuth.

(2) Sign. The sign should have an overall mounting height of not less than 20 inches (50.8 cm) and not more than 30 inches (76.2 cm). It should be located as nearly as practicable on an extension of the diameter line and faced perpendicularly to the line-of-sight of the viewer in the circle. The inscription on the sign contains the VOR station identification letters and the course selected (published) for the check, the words "VOR CHECK COURSE," and DME data (when applicable). The station identification and course numerals should be at least 7 inches (17.8 cm) high and the other letters and numerals at least 3 inches (7.6 cm) high. The color of the letters and numerals are black on a yellow background. An example follows:

DCA 176-356
VOR CHECK COURSE
DME XXX

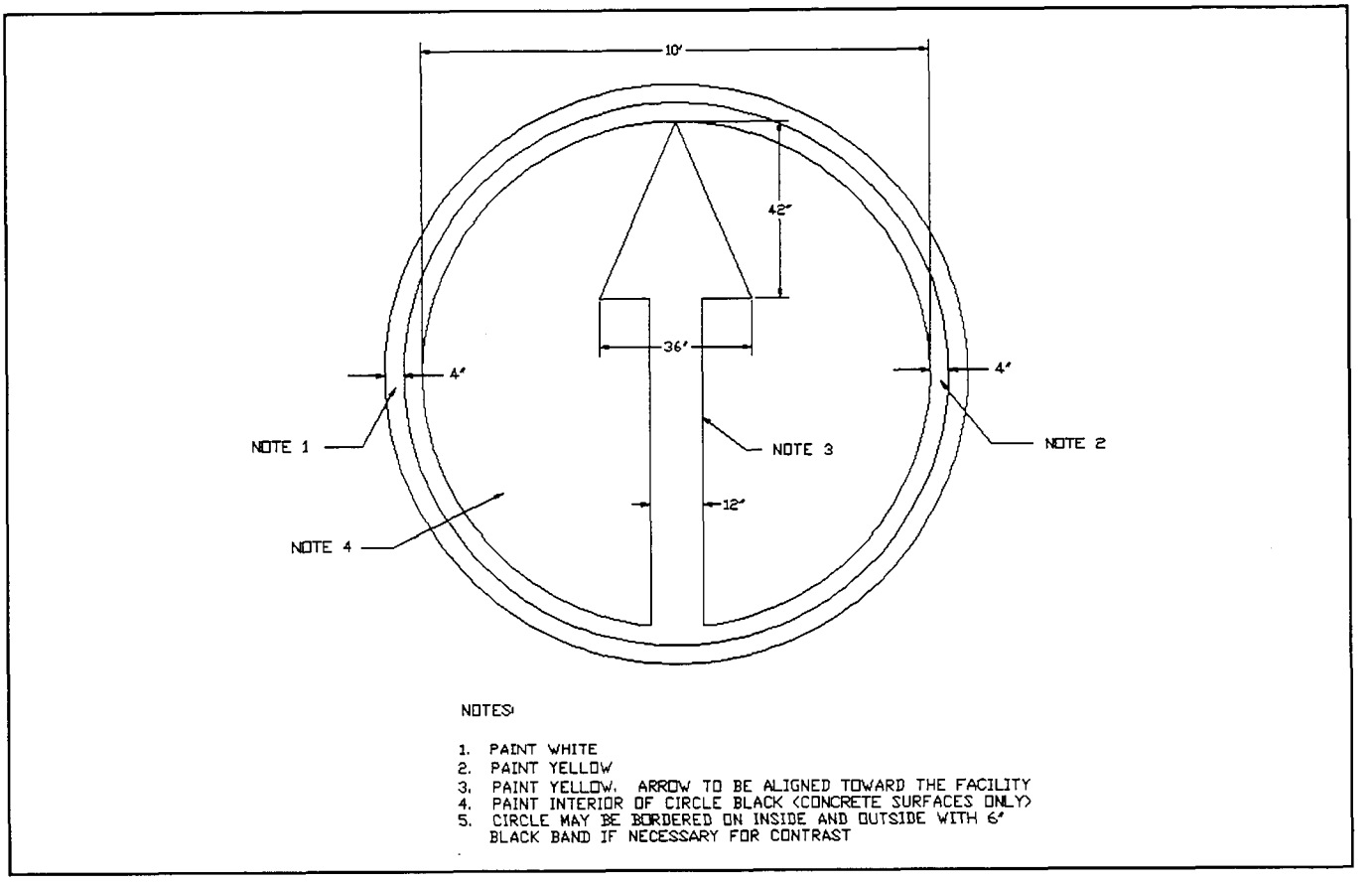


Figure 17. Ground Receiver Checkpoint Markings

32. NONMOVEMENT AREA BOUNDARY MARKING.

a. Purpose. Nonmovement area boundary markings are used when there is a need to delineate the movement area, i.e., area under air traffic control, from the non-movement area, i.e., area not under air traffic control. This marking should be used only when the need for this delineation is specified in the letter of agreement between the airport operator and airport traffic control tower which designates the movement area.

b. Color. The nonmovement area boundary marking is yellow.

c. Location. The nonmovement area boundary marking is located on the boundary between the movement and nonmovement area. In order to provide adequate clearance for the wings of taxiing aircraft, this marking should never coincide with the edge of a taxiway.

d. Characteristics. The nonmovement area boundary marking consists of two yellow lines (one solid and one dashed). The solid line is located on the nonmovement area side while the dashed yellow line is located on the movement area side. Each line is 6 inches (15 cm) in width with a 6 inch spacing between lines. The dashes are 3 feet (1 m) in length with a 3 foot (1 m) spacing between dashes. The nonmovement area boundary marking is shown in figure 10.

33. MARKING OF TEMPORARILY RELOCATED THRESHOLDS.

Information on the marking, as well as lighting, of temporarily relocated thresholds is contained in AC 150/5370-2, Airport Safety During Construction, current edition.

34. MARKING AND LIGHTING OF PERMANENTLY CLOSED RUNWAYS AND TAXIWAYS.

For runways and taxiways which have been permanently closed, the lighting circuits are disconnected. The runway threshold, runway designation and touchdown zone markings are obliterated and yellow crosses

are placed at each end and at 1,000 foot (300 m) intervals. If the closed runway intersects an open runway, crosses should be placed on the closed runway on both sides of the open runway. For taxiways, a yellow cross is placed on the closed taxiway at each entrance. The crosses shown in figures 18a and 18c are normally used, but the crosses shown in figures 18b and 18d are more readily seen from aircraft on final approach and may be used.

35. TEMPORARILY CLOSED RUNWAYS AND TAXIWAYS.

a. When it is necessary to provide a visual indication that a runway is temporarily closed, crosses are placed only at each end of the runway. The crosses are yellow in color and conform to the dimensions specified in figure 18. Since the crosses are temporary, they are usually made of some easily removable material, such as plywood or fabric rather than painted on the pavement surface. Any materials used for temporary crosses should provide a solid appearance. Since these crosses will usually be placed over white runway markings, their visibility can be enhanced by a 6" (15 cm) black border.

b. A raised lighted cross may be placed on each runway end in lieu of the markings described in paragraph 35a to indicate the runway is closed. The cross should be located within 250 feet (75 m) of the runway end.

c. Temporarily closed taxiways are usually treated as hazardous areas (see paragraph 40). However, as an alternative, a yellow cross that conforms to the dimensions in figure 18 may be installed at each entrance to the taxiway.

d. If the runway or taxiway will be closed during the nighttime, the runways lights will normally be disconnected so that they can not be illuminated unless such illumination is needed to perform maintenance operations on or adjacent to the runway, e.g., snow removal.

NOTE: The airport operator is responsible for determining the need for a visual indication that a runway or taxiway is closed. In making this determination, the airport operator should consider such things as the reason for the closure, duration of the closure, airfield configuration, and the existence and hours of operation of the airport traffic control tower.

36. CLOSED AIRPORTS. When all runways are closed temporarily, the runways are marked as in paragraph 35, and the airport beacon is turned off. When all runways are closed permanently, the runways are marked as in paragraph 34, the airport beacon is disconnected, and a cross is placed in the segmented circle or at a central location if no segmented circle exists.

37. HELIPORT MARKING. Information on the marking for heliports is contained in AC 150/5390-2, Heliport Design, current edition.

38. VERTIPORT MARKING. Information on the marking for vertiports is contained in AC 150/5390-3, Vertiport Design, current edition.

39. MARKING FOR ARRESTING GEAR. Information on the marking for arresting gear is contained in AC 150/5220-9, Aircraft Arresting Gear for Joint Civil/Military Airports, current edition.

40. HAZARDOUS AREAS. Marking of hazardous areas, in which no part of an aircraft may enter, are marked in accordance with AC 150/5370-2, Airport Safety During Construction, current edition.

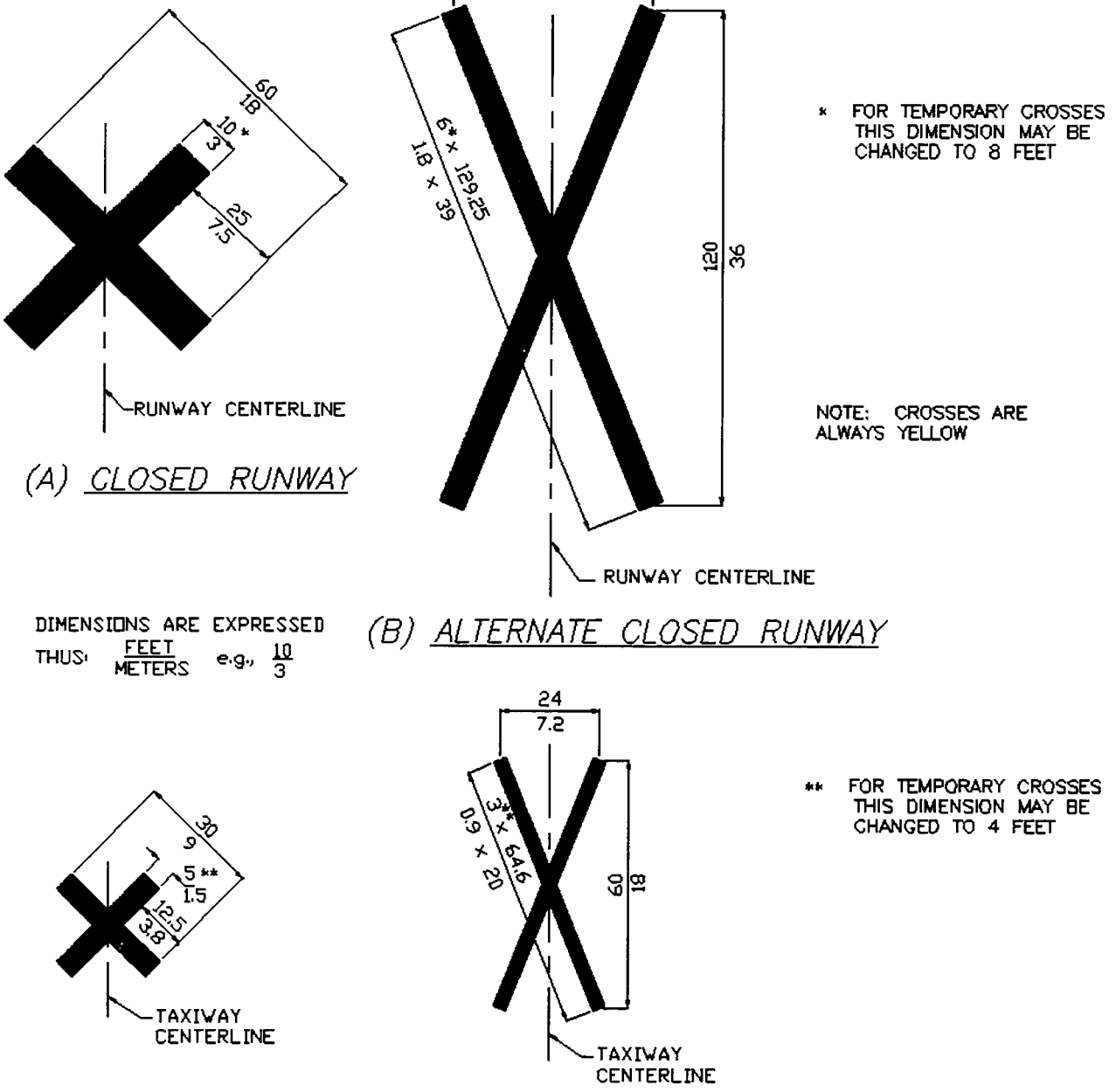


Figure 18. Closed Runway and Taxiway Markings

APPENDIX 1—INSCRIPTIONS FOR SIGNS AND GEOGRAPHIC POSITION MARKINGS

The shapes of the letters, numbers, and symbols used in inscriptions for surface painted signs and geographic position markings are shown in Figures A-1 through A-5.

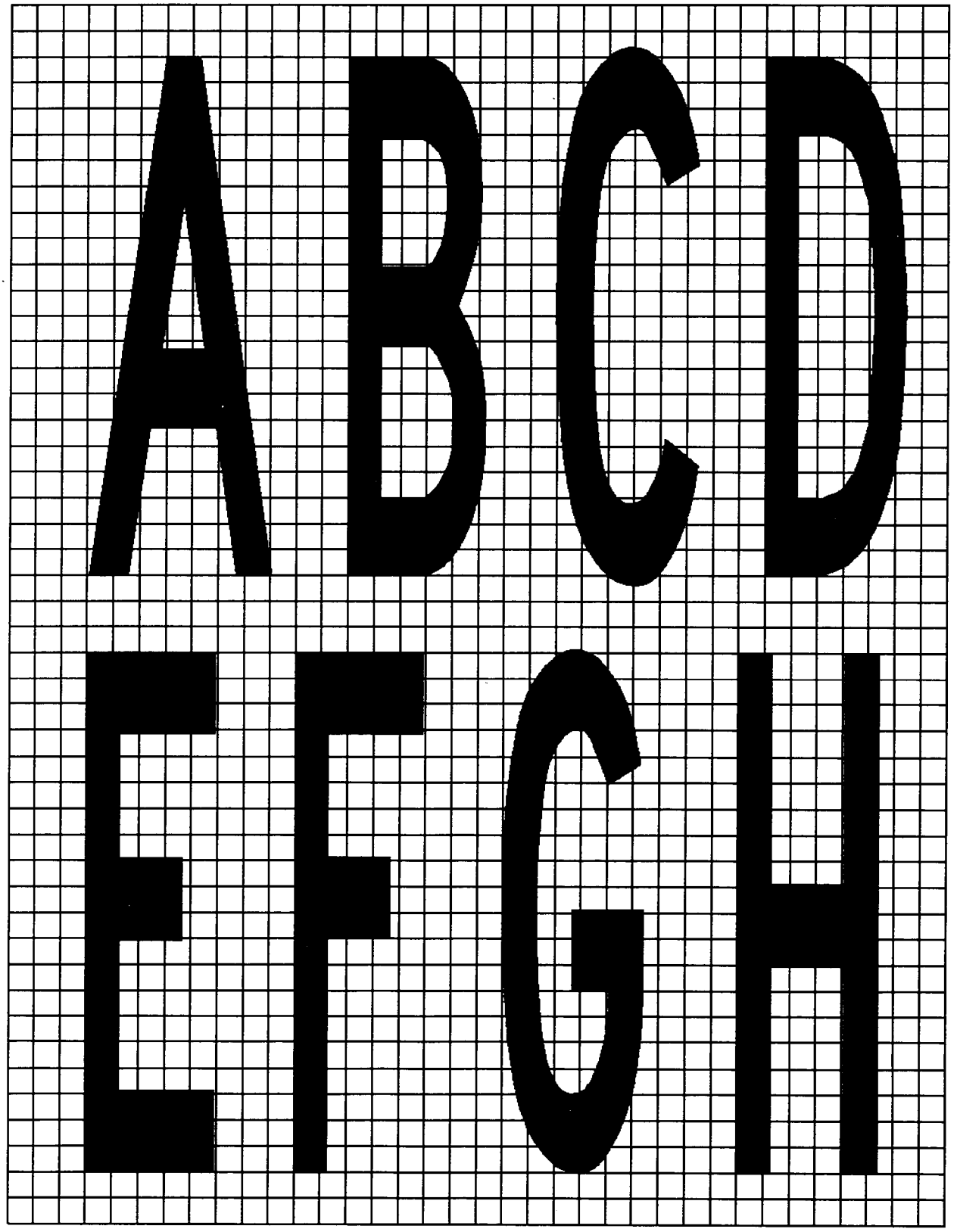


Figure A-1. Pavement markings ABCDEFGH

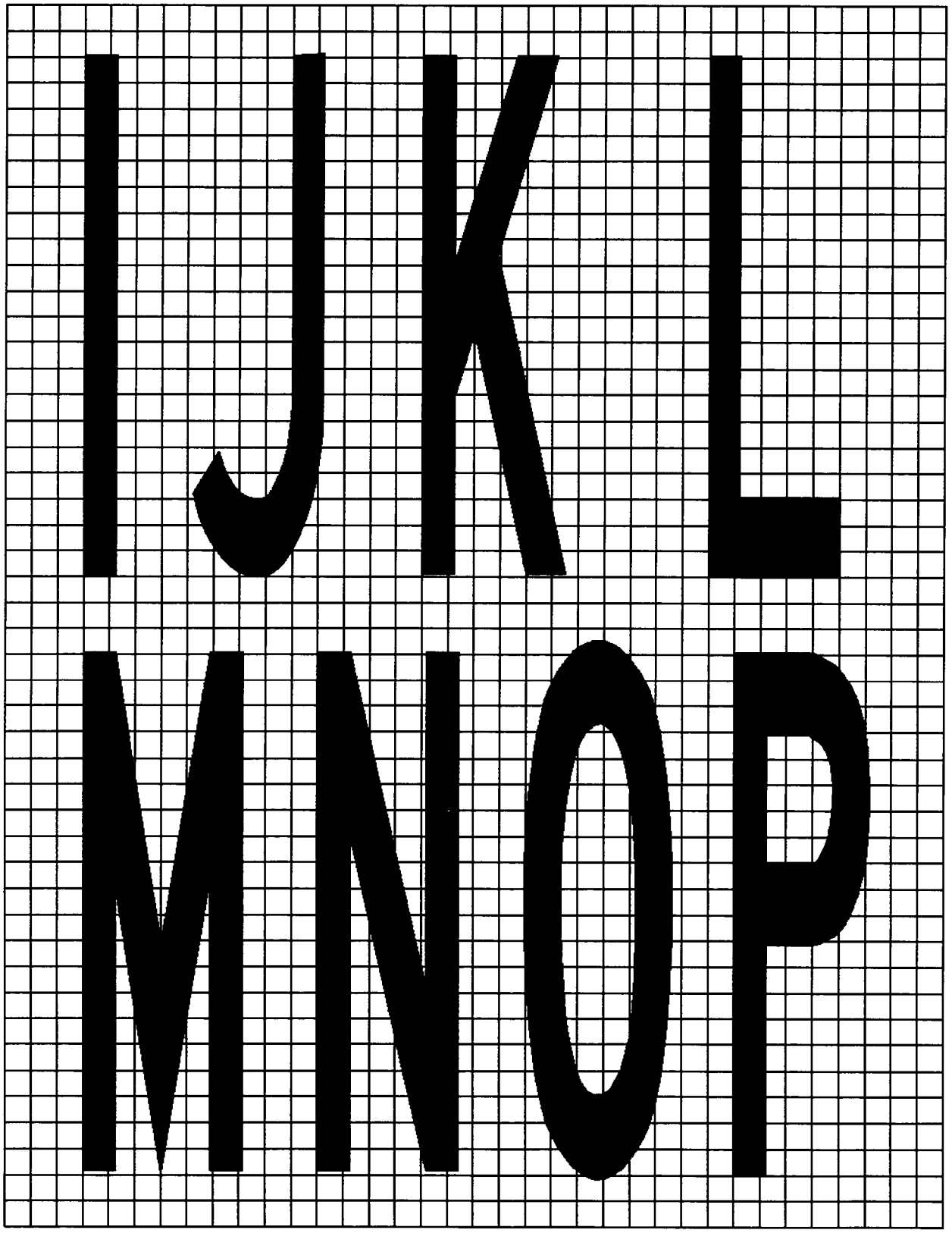


Figure A-2. Pavement markings IJKLMNOP

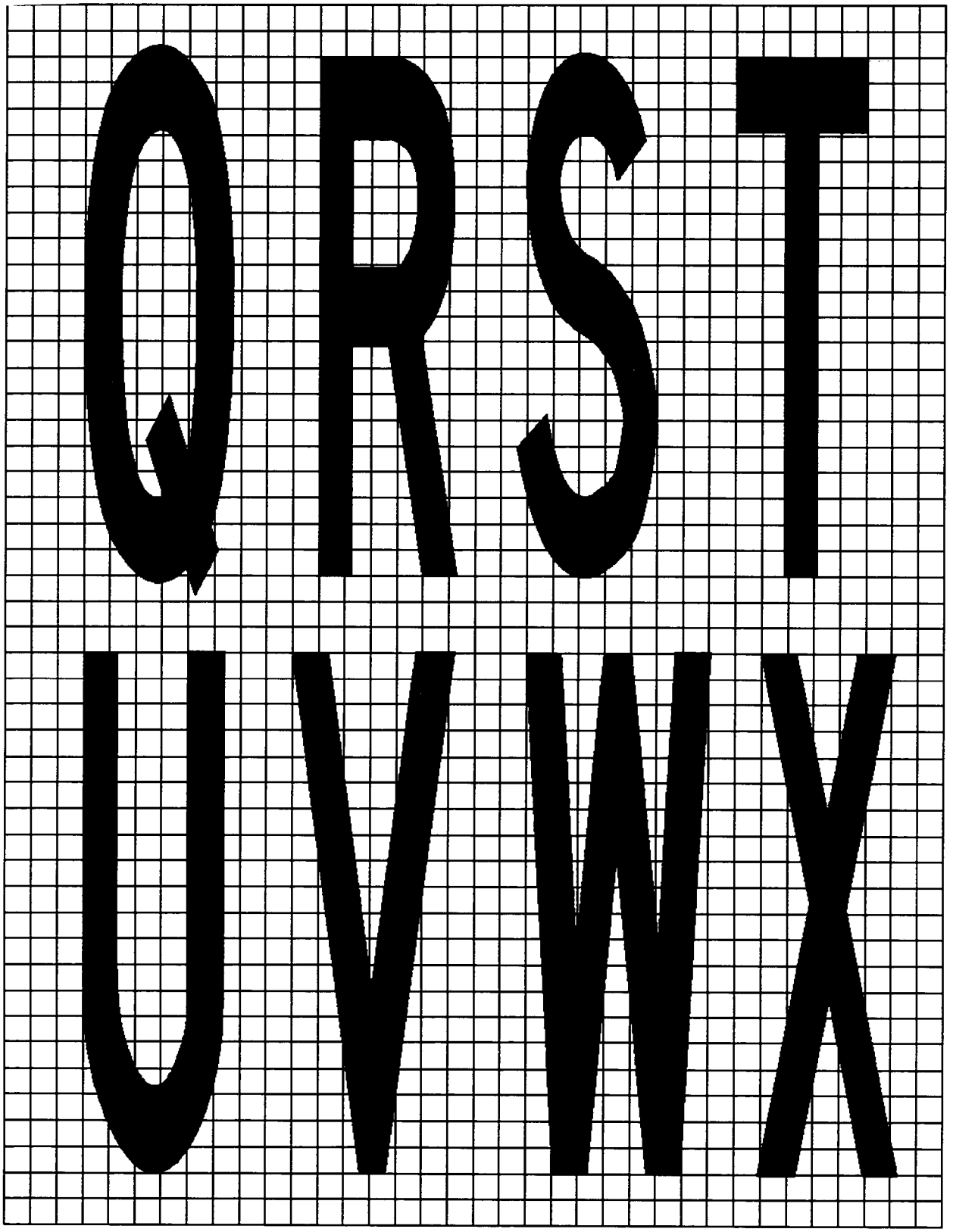


Figure A-3. Pavement markings QRSTUVWX

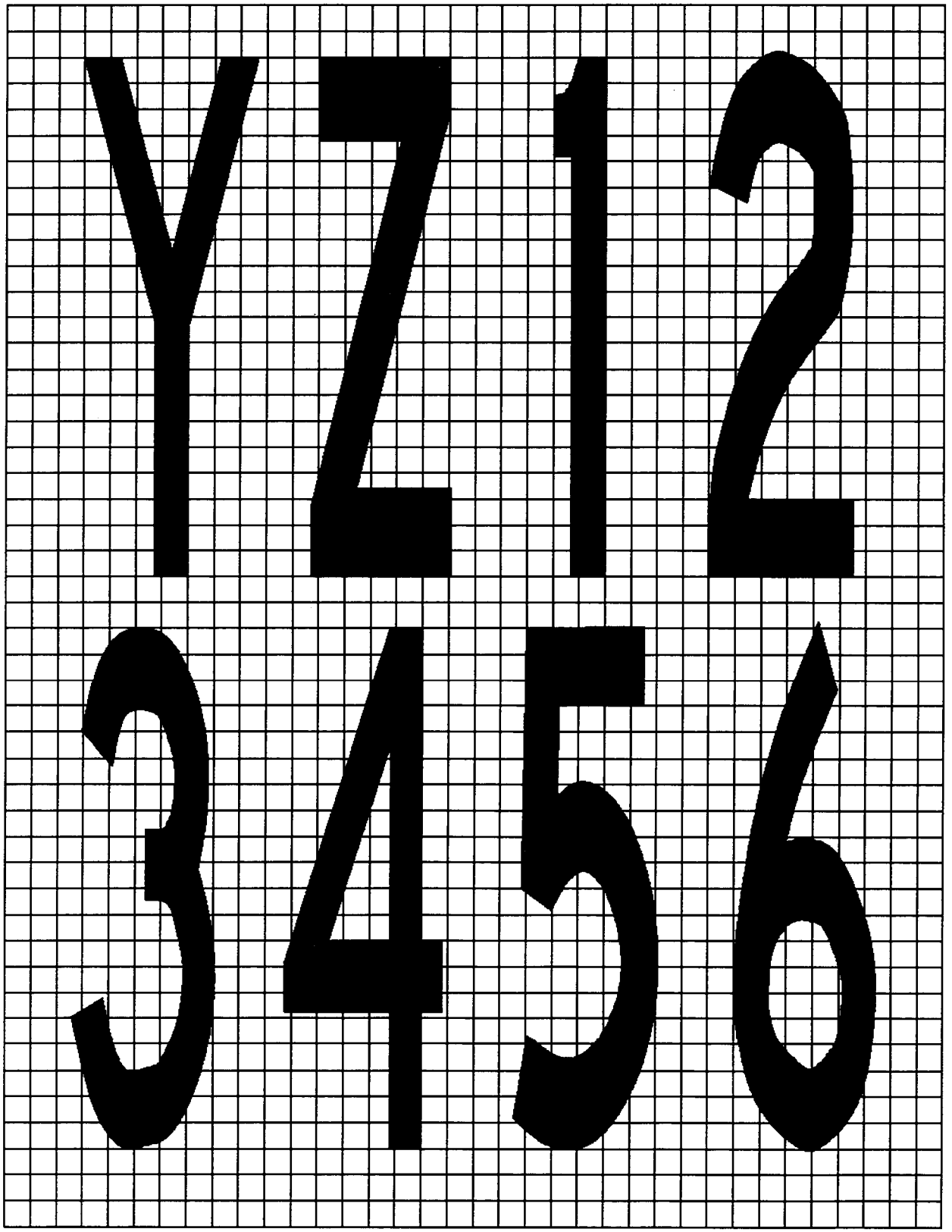


Figure A-4. Pavement markings YZ123456

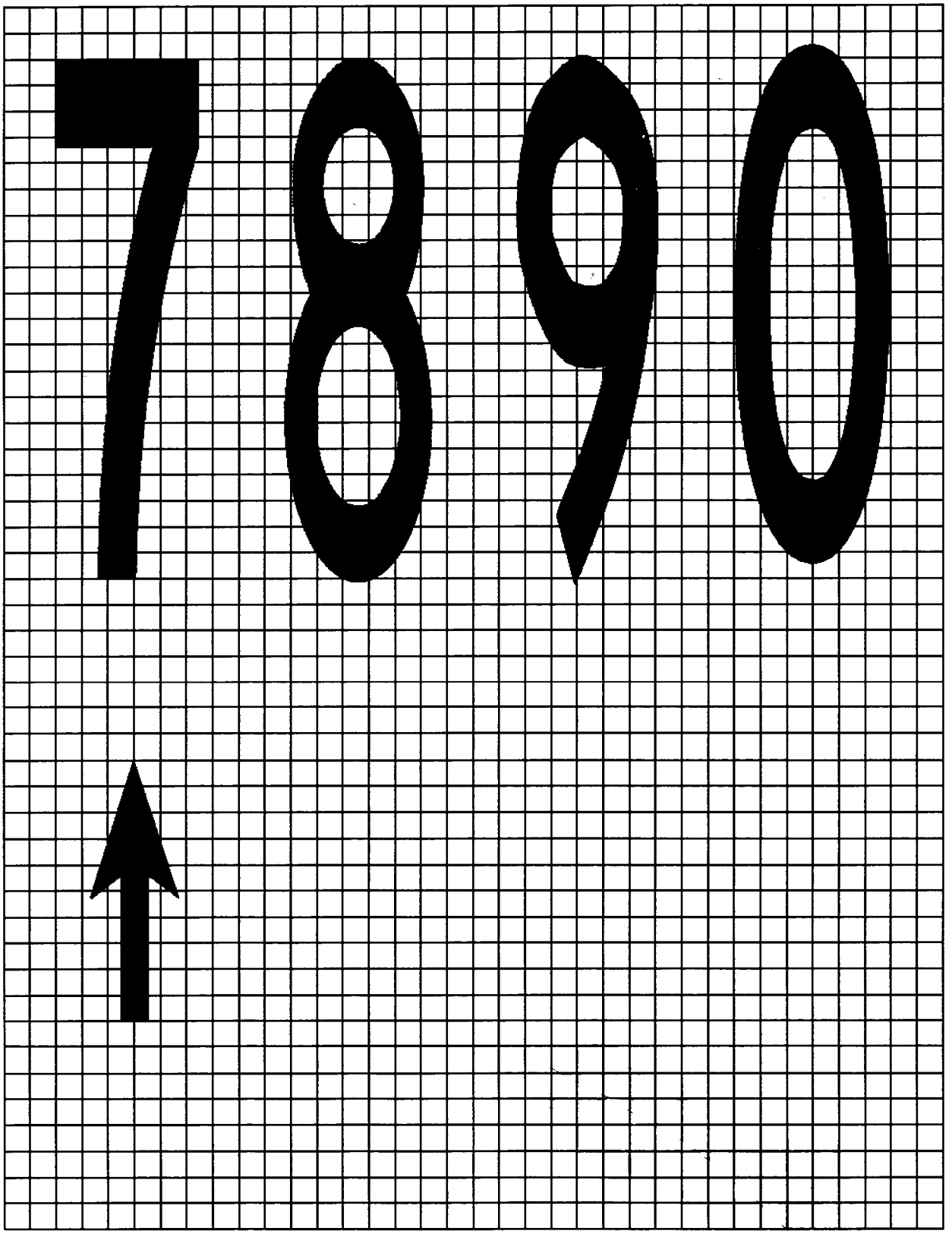


Figure A-5. Pavement markings 7890

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